The RUBBER AGE

December, 1943

TECHNOLOGY DEPT.

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DETROIT

BONDOGEN

BONDOGEN is used to good advantage in cements made of natural rubber or reclaim.

It seems to be even more valuable in cements made of GR-S. BONDOGEN smooths out the cement, retards jelling and reduces viscosity.

We suggest a trial of one pint to one quart of BONDOGEN to 25 gallons of solvent before adding the GR-S stock.

R. T. VANDERBILT CO., INC.
230 Park Avenue, New York City

Newsletter No. 12
DECEMBER, 1943

Published by Rubber Chemicals Division of DU PONT

FLAME RESISTANCE OF NEOPRENE AN ADDED ADVANTAGE

THE present very large use of neoprene, including GR-M, by the rubber industry means that many articles and assembly parts are now flame resistant and, therefore, safer to employ. Neoprene will burn but *only* so long as a supporting flame is present. It is highly flame resistant, due, of course, to the substantial amount of chlorine chemically combined in it. This safety factor cannot be overstressed and is always present in neoprene products even though the products are used because of oil resistance or some property other than flame resistance. This is especially true in airplane parts, insulated wire and cable, crash pads, ship accessories and many other products that are being made of neoprene.

All types of neoprene are about equally flame resistant in similar formulations. Obviously, flame resistance is not different from any other property in that it will vary in degree in neoprene compositions depending on what compounding ingredients are incorporated in them. For the most flame resistant compounds, flammable ingredients should be avoided and fillers like antimony oxide, magnesium carbonate and clay should be used. Conventional amounts of the usual softeners may be used without appreciable detraction from flame resistance. However, practically any neoprene compound that might be employed is more flame resistant than a rubber compound.

TESTS Flame resistance is determined by the Du Pont Vertical Tube method which consists of suspending a 6-inch strip of the test material in a glass chimney over a Bunsen flame and noting the time required to burn the strip. If the strip is not completely burned because the flame from the burning sample extinguishes itself, the distance burned as well as the burning time is recorded.

When rubber, GR-S and neoprene strips, compounded similarly and to the same extent, are tested by this method, results similar to those shown at right are obtained:

	Rubber	GR-S	Neoprene
Original length of sample—inches	6	6	6
Burning time—seconds	35	40	300
Inches consumed	6	6	3
Inches burned per minute	10.3	9	0.6

The full difference in flame resistance between rubber and neoprene is not shown by these data, since they do not reflect the fact that the neoprene sample actually stopped burning in 5 minutes or less when only half of the test strip was consumed by the flame. Only so long as the Bunsen flame was in contact with the strip did it burn, whereas the rubber and GR-S strips, after being ignited, burned vigorously to completion.

FLAME RESISTANT SPONGE Due to its cellular structure, sponge rubber burns much more rapidly than solid, non-porous rubber. Because of this, the vertical burning test method referred to at left is too severe for measuring accurately the burning rate of such material. In testing sponge, therefore, we have used a method in which the test sample is held horizontally with the Bunsen flame touching one end and noting the time for the flame to travel one inch, or less if it extinguishes itself before an inch of sample is consumed. Using this test, sponge samples made of rubber latex and neoprene latex were compared. The samples contained curing agents but no loading and and were as near "pure gum" as possible in a vulcanized product.

	LATEX SPONGE	
	Rubber	Neoprene
Density—grams per c.c.	0.23	0.20
Sample size—cross section—inches	0.5 x 0.5	0.5 x 0.5
Burning time—seconds	10.0	16.0*
Length consumed—inches	1.0	0.125
Inches burned per minute	6.0	0.4

*Flame went out at end of 16 seconds; only 0.125" burned

RETURN THOSE METAL DRUMS

Metal drums are scarce and permission to purchase new ones cannot be obtained unless a high percentage of returned used ones can be proven. It is important that those in which neoprene latex is shipped be returned promptly if containers for additiona' shipments are to be made available.

Please do not use neoprene latex drums for other purposes. Rinse them out and return them promptly. Ceiling prices for returned drums are paid and return freight charges east of the Mississippi River are allowed.

DU PONT
RUBBER CHEMICALS DIVISION
BETTER THINGS FOR BETTER LIVING . . . *Through Chemistry*

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Announcing another

Hycar Price Reduction

FOR the third time in two years the prices of Hycar synthetic rubber have been reduced, maintaining our policy of passing on to industry the savings we have been able to make by steadily increasing production and operating economies through more efficient operations.

Hycar OR-15, for example, has been reduced from 77c to 70c to 63c and is now reduced again. The prices of all other Hycar products are also lower by about 10%.

Price Schedule

EFFECTIVE NOVEMBER 1, 1943

	Price per lb. Standard 100 lb. Containers	Price per lb. Less than Standard Container	Specific Gravity
Hycar OR-15	$0.56	$0.72	1.00
Hycar OR-25	0.50	0.66	0.98
Hycar OS-10	0.50	0.66	0.98

Prices are net and F. O. B. Akron, Ohio

Hycar is currently as critical as ever, but due to its importance in solving many difficult problems WPB now permits shipments up to 25 pounds per month, for experimental purposes, without allocation. Our Customer Service Laboratory is always ready to work with you, without cost, in your experimental work. *Hycar Chemical Company, Akron 8, Ohio.*

Hycar

LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE

Synthetic Rubber

THE SIGN OF THE MOST COMPLETE LINE OF ZINC OXIDES

• The Sign of the most complete range of zinc oxide particle size characteristics — ranging from the colloidal dimensions of Kadox to the relatively coarse Horse Head XX Red-78.

• The Sign of the manufacturer of both "fast" curing and "slow" curing zinc oxides.

• The Sign of zinc oxides made under three different processes—American Process, French Process, Palmerton Process — in order to impart special properties to meet a variety of special rubber requirements.

• The Sign of the manufacturer of special zinc oxides for improved processing.

• The Sign of the largest and best equipped research organization devoted to the study of zinc products.

THE NEW JERSEY ZINC COMPANY

Manufacturers of the Famous Horse Head Zinc Products

Have you tried
NAFTOLEN
In the making of your product?

In the field of compounding ingredients for natural and synthetic rubber, NAFTOLEN is unique. You can use whatever amount that may be necessary to produce the desired plasticity and the necessary processing characteristics, and yet retain the vulcanizable characteristics of the compound. If, in the making of your product, you are having processing and compounding difficulties, we would suggest that you try NAFTOLEN. Its use will give you stocks that will tube smoothly, calender well, and have a high degree of tack.

WILMINGTON CHEMICAL CORPORATION

10 East 40th Street · New York 16, N. Y.

Plant and Laboratory: Wilmington, Delaware

Wasting Rubber Is An Extravagance Which We Can Ill Afford Today

ONE form of waste in the rubber industry which can be easily prevented is that which occurs when rubber stocks stick to untreated liners. This usually results in a waste of some of the rubber and a loss of time, effort and materials when the rubber has to be stripped from the liner and reworked.

The solution to this problem is to use liners treated by the *Capitol Process* — the economical and efficient method which renders cotton piece goods repellent to adhesion of rubber stocks and prolongs the life of the fabric at a low cost.

★

TEXTILE PROOFERS, INC.

181-193 Culver Ave. Jersey City 5, N. J.

Originators of the Capitol Process Liner Treatment

Nerve Killers for
BUNA N

4131 XLX 4142

XLX Compounds have solved production bottlenecks in compounding Buna N stocks.

XLX Compounds are effective "nerve killers" and processing aids for Buna N stocks, particularly those of low pigment concentration.

XLX Compounds do not detract from low temperature flexibility.

XLX Compounds in Buna N stocks are not oil or gasoline extractable.

OTHER XLX COMPOUNDS—*XLX 4135* is an efficient processing aid for GR-S stocks and improves hot and cold tear and flex-cut growth resistance.

XLX 4132 increases hardness of GR-S stocks and improves tear and cut-growth resistance. Hardness of GR-S stocks may be varied without recourse to fillers.

XLX

For further technical information, samples and prices write

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DISPERSION TECHNICIANS · BOUND BROOK · NEW JERSEY

AMERIGUM

–a series of
Synthetic Resinous
PLASTICIZERS
and EXTENDERS
for GR-S and other
Synthetic Rubbers

★

–Decrease Milling Time

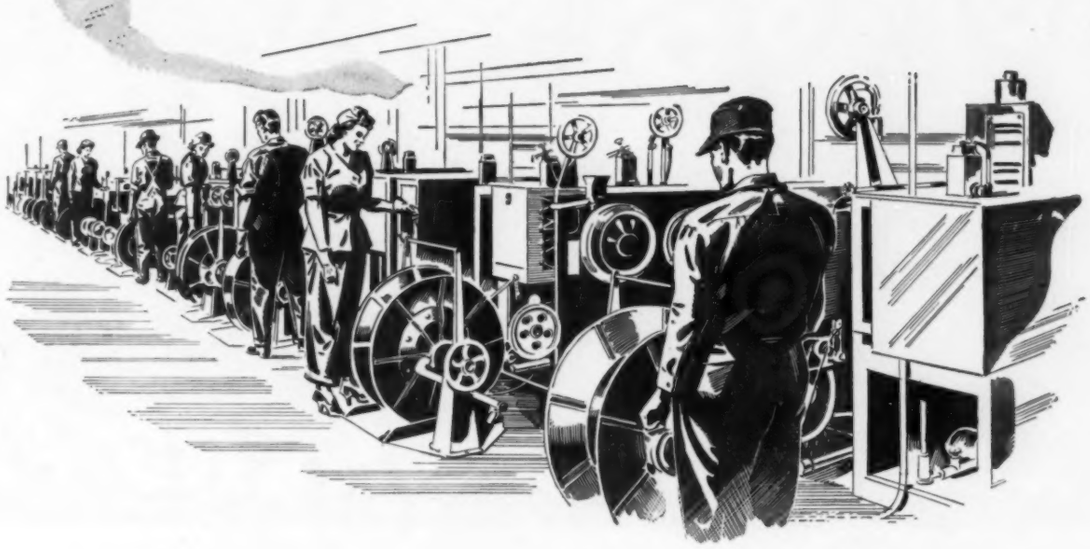
–Improve Tear Resistance

–Impart High Tensile Strength

LITERATURE AND SAMPLES AVAILABLE

AMERICAN ALKYD INDUSTRIES, INC.
CARLSTADT, N. J.

There's RUBBER DUST in our wire-drawing room



NATIONAL-STANDARD devotes so much of its wire production to the rubber industry that the term "rubber dust" is familiar even to the men in our wire-drawing rooms. We've worked with tire engineers in producing better bead wire, braids and tapes; with mechanical goods men on new uses for wire in flat and V-belts and braiding for hose; with aviation experts on improving the performance of non-skid tires and de-icers, with wire.

We don't think for a minute that all the uses for wire with rubber have been explored. We're constantly working on new ideas and we know that you are too. If you've got a problem to solve, perhaps our experience and research facilities can help. We try to make National-Standard the kind of place where you'll get the quickest answers, most helpful service, and the very best wire it is possible to produce.

★ ★ NATIONAL STANDARD Company ★ ★

Divisions of National-Standard Company

NATIONAL-STANDARD
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WAGNER LITHO MACHINERY
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ATHENIA STEEL
Clifton, N. J.
FLAT, HIGH-CARBON STEEL

WORCESTER WIRE WORKS
Worcester, Mass.
ROUND STEEL WIRE, SMALL SIZES

SURMOUNTING the difficulties attendant to making delivery of *what you want when you want it* is all a part of our regular day's work. When you MUST have solvents right now, *or else*—tell it to us and you'll get them. The entire Skellysolve organization is geared to heavy-duty performance. It had to be that way to get where it is today!

As to unvarying dependability of Skellysolve quality—that important point is fully guaranteed.

SKELLYSOLVE
in the
RUBBER INDUSTRY

There are six different types of Skellysolve which are especially adapted to various uses in the rubber industry, for making rubber cements, and for many different rubber fabricating operations. Skellysolve offers many advantages over benzol, rubber solvent gasoline, toluol, carbon tetrachloride, etc. It will pay you to investigate Skellysolve. Write today.

SKELLY

SKELLYSOLVE

SOLVENTS DIVISION, SKELLY OIL CO.
SKELLY BLDG., KANSAS CITY, MO.

PELLETEX and GASTEX

Help Keep Our Planes In the Air

Photo Courtesy B. F. Goodrich Co.

A large and important war use of PELLETEX and GASTEX compounds is for the linings of bullet proof fuel tanks for aircraft. Thanks to the special properties which these leading semi-reinforcing furnace blacks possess, such compounds are stronger against puncture, while their solvent resistance gives them longer service life.

We are glad that our products can make this definite contribution to the marvellous efficiency and safety of our airforce.

HERRON BROS. & MEYER

OHIO BLDG., AKRON, OHIO.

GASTEX TRADE MARK

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GENERAL ATLAS CARBON DIVISION

OF GENERAL PROPERTIES COMPANY, INC.

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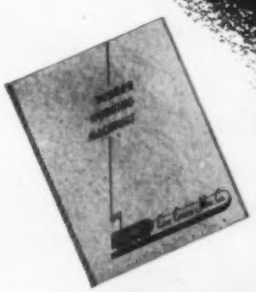
Built for long life, with minimum repairs EEMCO mills are made in various sizes from the 12 inch laboratory mill up to and including 84 inch mill. Correctly designed, carefully constructed and sturdy EEMCO mills are unusually strong in the parts subject to heavy strains. Write to EEMCO for details, no matter what your rubber working requirements may be.



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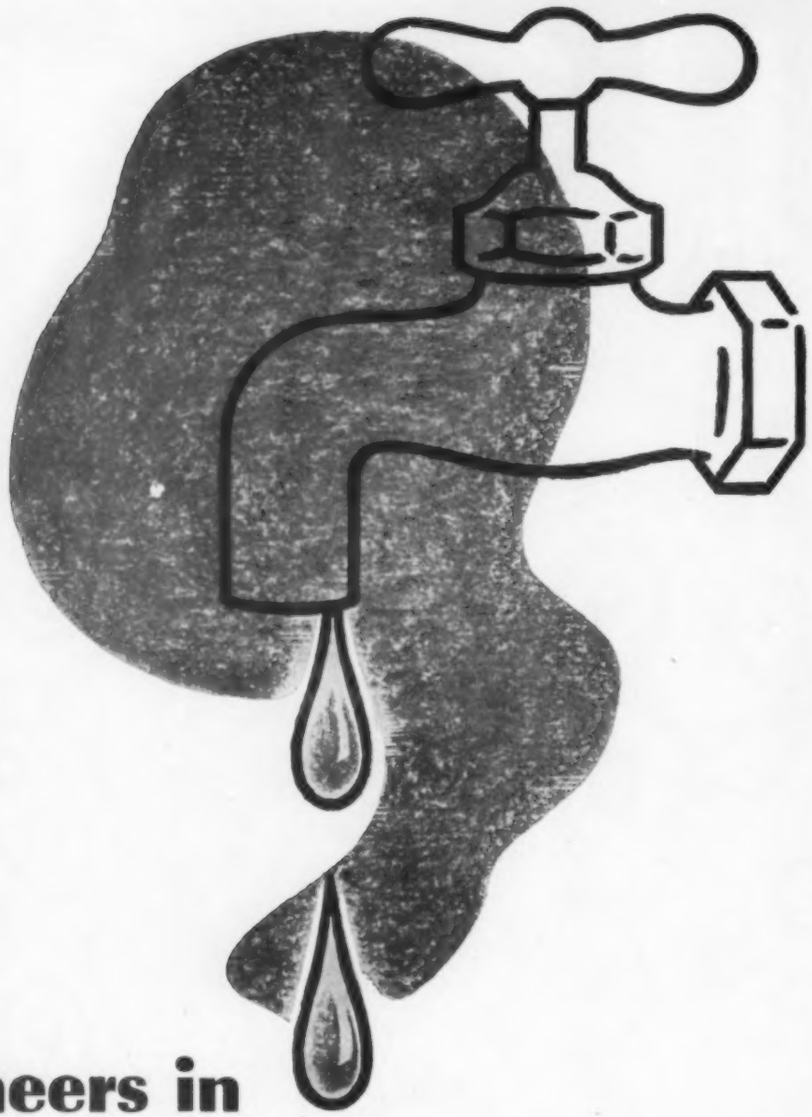


Pioneers in water-dispersed materials

In addition to long experience with latex and water dispersions of crude and reclaimed rubbers, we disperse many elastomers and compositions applicable to use in adhesives, saturations, coatings and dipped goods. Our laboratories and plant are at the service of industry.

Dispersions Process, Inc.

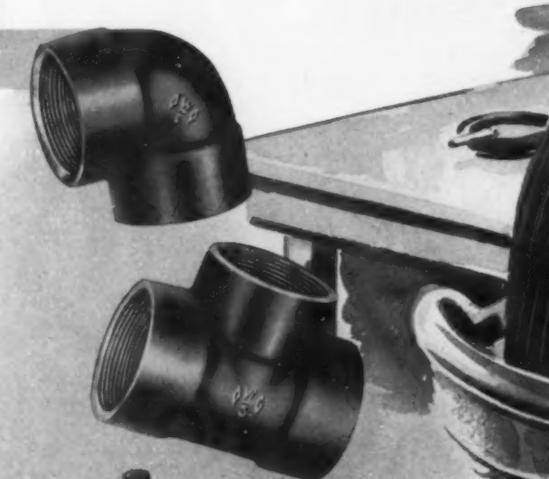
symbolizing research and development in water dispersions

(under management)

UNITED STATES RUBBER COMPANY

1230 Sixth Avenue, New York 20, N. Y.

ECONOMY IN LOW MAINTENANCE COST



Watson-Stillman has prepared these two attractive, fact-packed booklets which give complete details of the entire line of Forged Steel Fittings and Valves.

Many engineers specify Watson-Stillman Forged Steel Fittings and Valves because they know that the best is the lowest in cost in the long run. W-S products are known for their Reliability, Long Wearing Qualities and Efficiency in high or low pressure services. These factors contribute to low maintenance cost, which should be your first consideration when buying fittings and valves.

Maintaining production lines at the present high rate of output requires more than unlimited supply of raw materials and skilled labor. Plant equipment must be kept moving. A breakdown in a pipe line, caused by a leak or structural weakness in a key spot, shuts down the whole system, piles up costs in lost man hours and increased overhead. Such losses might have been avoided by the installation, in the beginning, of W-S Forged Steel Fittings and Valves for high or low pressure service. The Watson-Stillman Co., Roselle, N. J.

WATSON-STILLMAN

Distributor Products Division

Designers and Manufacturers of Forged Steel Fittings and Valves, and Hydraulic Equipment

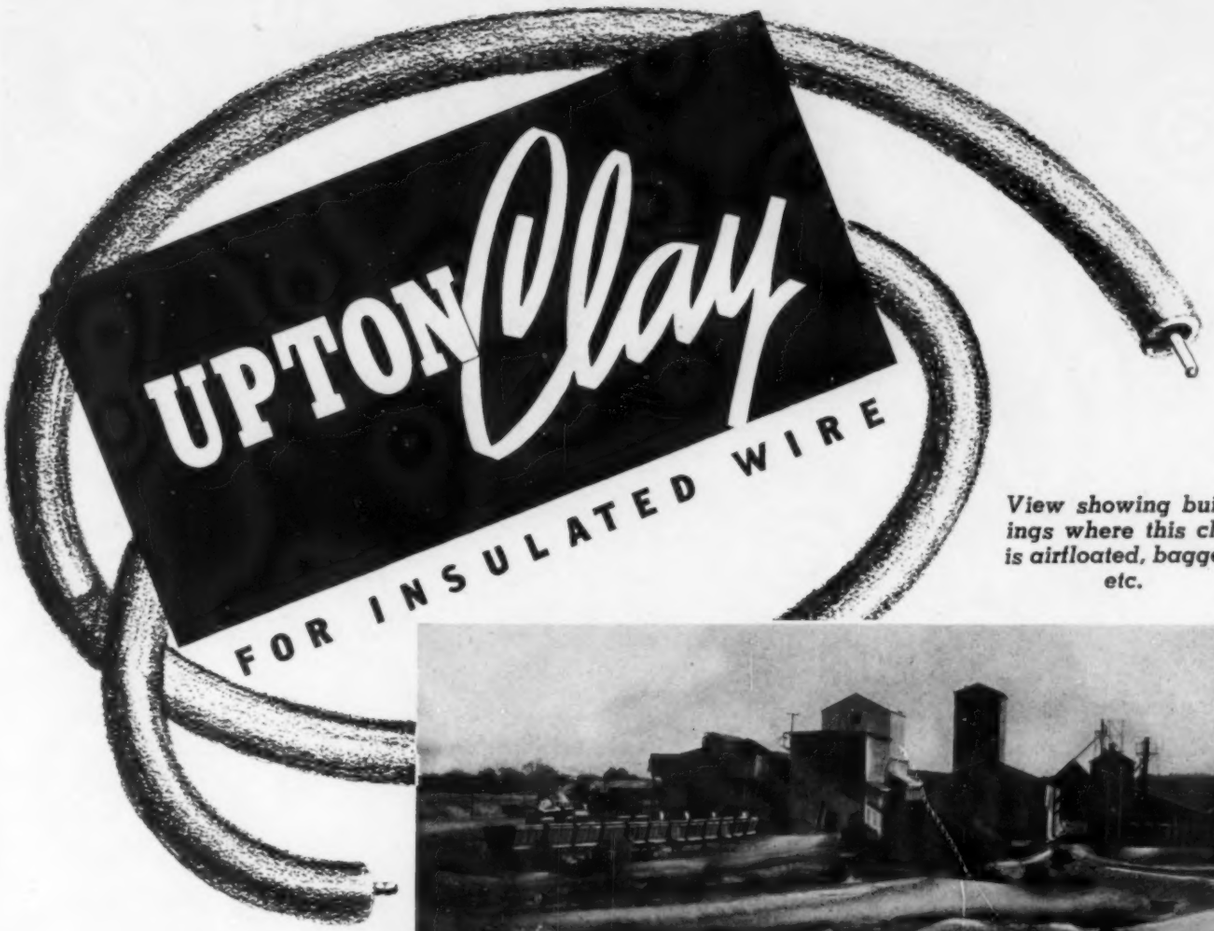
502

For Victory ★★★ Let's all be Scrappers

Season's Greetings and Best Wishes for 1944

PENNSYLVANIA INDUSTRIAL CHEMICAL CORPORATION

CLAIRTON, PENNA.



View showing buildings where this clay is airfloated, bagged, etc.

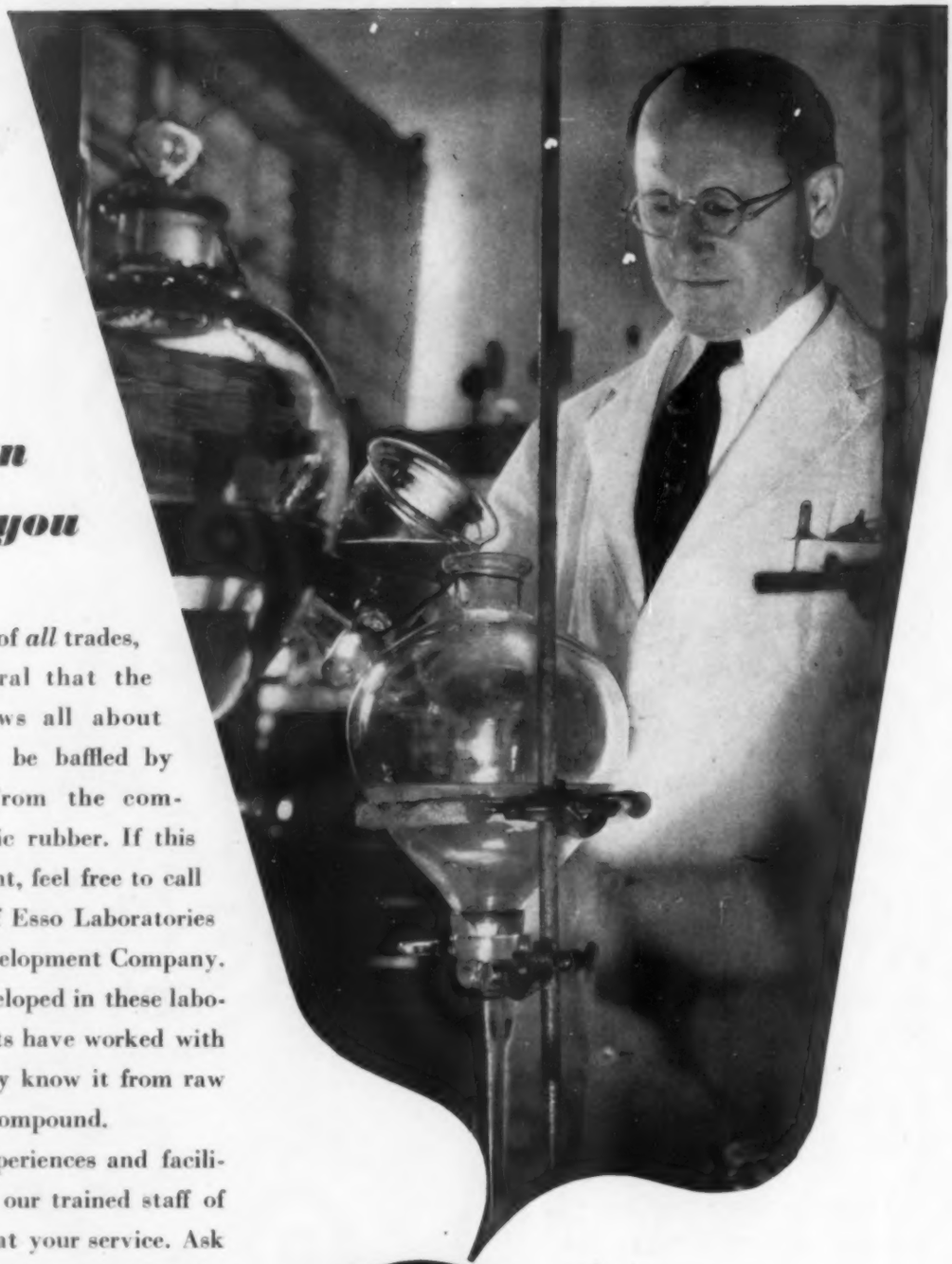
General view of "the deposit" where "UPTON CLAY" is mined.

Here is an unusually smooth grit free and MICA free clay that has proven ideal for use in Buna and especially Neoprene jackets.

It disperses nicely, helps smooth out the stock and improves tubing.

A testing sample is yours for the asking.

UNITED CLAY MINES
CORPORATION
High Grade **CLAYS** of all kinds
TRENTON NEW JERSEY



We can help you

No man can be jack of *all* trades, and it's only natural that the engineer who knows all about natural rubber may be baffled by problems arising from the compounding of synthetic rubber. If this happens in your plant, feel free to call on the experiences of Esso Laboratories of Standard Oil Development Company.

Perbunan was developed in these laboratories. The scientists have worked with it for years, and they know it from raw material to finished compound.

Not only their experiences and facilities, but the help of our trained staff of field technicians are at your service. Ask these men for the answers to your problems . . . and you'll save yourself a lot of time and effort!

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REG. U. S. PAT. OFF.

THE SYNTHETIC RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME

Write

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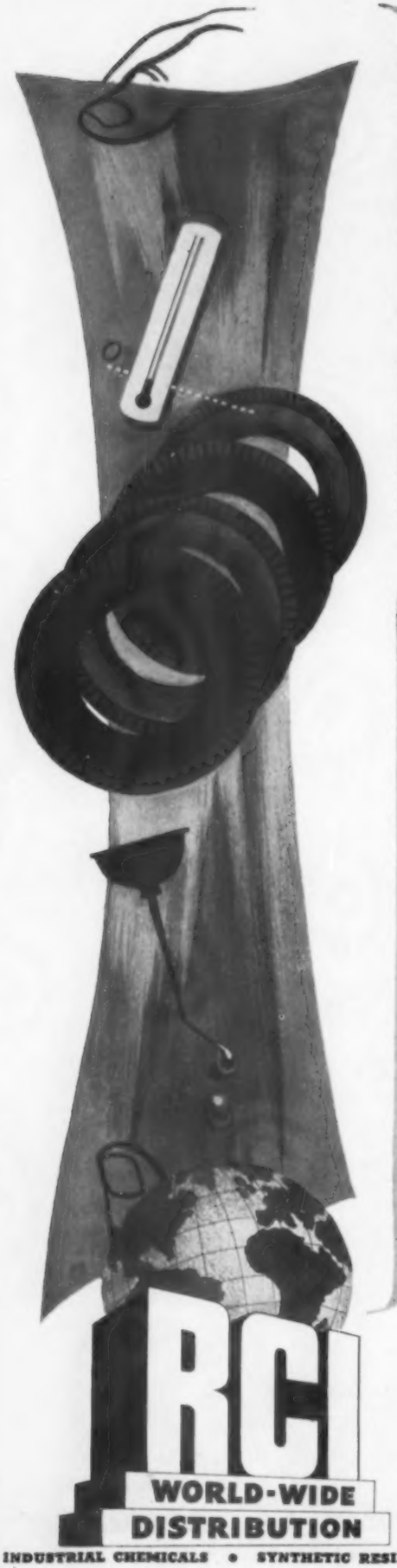
Greetings

With our sincere wishes for a bright and happy holiday season.

Precision Chemicals For The Rubber Industry

STANDARD *Chemical Company*
GENERAL OFFICE: AKRON (8) OHIO



RCI plasticizers give synthetic rubber versatility

RCI products and service offer synthetic rubber manufacturers valuable and practical aid in solving their manifold problems.

RCI, for example, is a volume producer of three different plasticizers for rendering synthetic rubbers resistant to oil, aromatic and aliphatic solvents—dibutyl phthalate, dibutyl sebacate and RC-103 Plasticizer. These three permit a considerable variation in production costs and a wide choice of properties.

In addition, RCI offers customers the active aid of a research personnel with broad experience in the synthetic rubber and related fields.

Write direct to the Sales Department in Detroit for full details on RCI plasticizers and RCI service—a combination which has already done much to add to the versatility and usefulness of many types of synthetic rubber.

ARMY E NAVY

REICHHOLD CHEMICALS, INC.

General Offices and Main Plant, Detroit, Michigan

Other Plants: Brooklyn, New York • Elizabeth, New Jersey
South San Francisco, California • Tuscaloosa, Alabama
Liverpool, England • Sydney, Australia

INDUSTRIAL CHEMICALS • SYNTHETIC RESINS • CHEMURGIC RUBBER • CHEMICAL COLORS • INDUSTRIAL PLASTICS

What's in a Bale of Cotton?

Who knows? No package of comparable size and modesty is so rightly filled with treasures.

So far, we have found gas masks and boats, signs that warn of danger and direct our pursuing armies along the route of the fleeing foe.

We have found working drawings of amazing clarity and maps that survive duty in the field. We have found identifying tags that stay with parts despite long routes and much handling.

We have found combinations for developments with plastics; book cloths that defy climatic deterioration; and linings for shoes that keep our armies moving on the best marching feet in the world.

These things, and many more, we already have found in a bale of cotton. But the search goes on because *HOLLISTON MILLS* have dedicated their experience and resources first, to discovering more that processed cotton cloths can contribute to the war effort and, second, to the advancement of industry.

CURRENT HOLLISTON PRODUCTION includes COATED AND IMPREGNATED FABRICS, mildew proof . . . fire, weather and water resistant . . . gas impermeable, etc. INSULATING CLOTH BASE . . . SEPARATOR CLOTHS rubber, starch-filled, glazed. TRACING AND BLUE PRINT CLOTHS white and blue, ink or pencil. MAP CLOTH, PHOTO CLOTH, self-adhesive. REINFORCING FABRICS. SIGN, LABEL AND TAG CLOTHS, waterproof to take any ink, meet any inking problem. BOOK-BINDING CLOTHS. SHADE CLOTH, impregnated waterproof, opaque, translucent or light proof.

IN DEVELOPMENT: Mildew-proofing and asphalt-impregnating processes; fire and weather-resistant treatments; synthetic resin fillings and coatings applicable from nettings to duck.

In general, HOLLISTON can convert any print cloth, sheeting, twill and duck in widths from 30" to 80" and can dye, impregnate, coat and fill in any color to specified stiffness or pliability, hand, bond, weight addition and tensile strength, including Elmendorf tear strength, for any trade, commercial or industrial use. We have both the wish and the capacity to cooperate on production problems.

We urge you to consider CLOTH; and invite you to consult with us concerning possibilities and developments for your specific requirements.

THE HOLLISTON MILLS, INC.

CONVERTING CLOTHS TO GREATER USE FIELDS

NORWOOD, MASSACHUSETTS

Sales Agents in Principal Cities

Chemical Uniformity contributes to the wonders of NEOPRENE

It looks like rubber, but it isn't. It has many characteristics of rubber, but effectively resists oil, sunlight, heat and many chemicals. Commercially it's called neoprene.

Neoprene's pre-war uses were numerous in manufacturing parts for the industrial field. Since Pearl Harbor, neoprene uses in fabrication have been widely increased. Because of the unique properties of neoprene it has been given many war jobs, and is doing them well.

Neoprene is mixed with compounding ingredients and vulcanized to form the final product. The successful use of neoprene for peace and war-time projects depends to a great extent upon the uniformity of the chemicals used in compounding and processing it.

One of these is Baker's Magnesium Oxide, Neoprene Grade, made and packaged especially for users of this material. Here, as in many other industries where chemical exactness is paramount, Baker is an important supplier of chemicals to exacting specifications. Baker's chemicals—purity by the ton—have been made for a large number of the nation's leading concerns for the manufacture or processing of numerous products. The roll call of Baker's customers reads like Who's Who in America.

If you have special chemical requirements involving purity to the decimal for war production products or for the anticipated post-war reconversion program, we invite you to discuss your needs in confidence with Baker.

J. T. BAKER CHEMICAL CO.

PHILLIPSBURG, NEW JERSEY

NEW YORK PHILADELPHIA CHICAGO

Baker's Chemicals

C. P. ANALYZED • FINE • INDUSTRIAL

Baker's

FOR HEAVY DUTY PERFORMANCE

Continental "A"

THE PROVEN REINFORCEMENT

SEND FOR SAMPLES

ONE OF THESE GRADES IS YOUR BLACK: Continental "AA" low heat generating, easy processing. Continental "A" medium cure, medium easy processing, low extruding. Continental "D" standard.

FOR HIGH CONDUCTIVITY— Continental R-40, and a complete line of color blacks.

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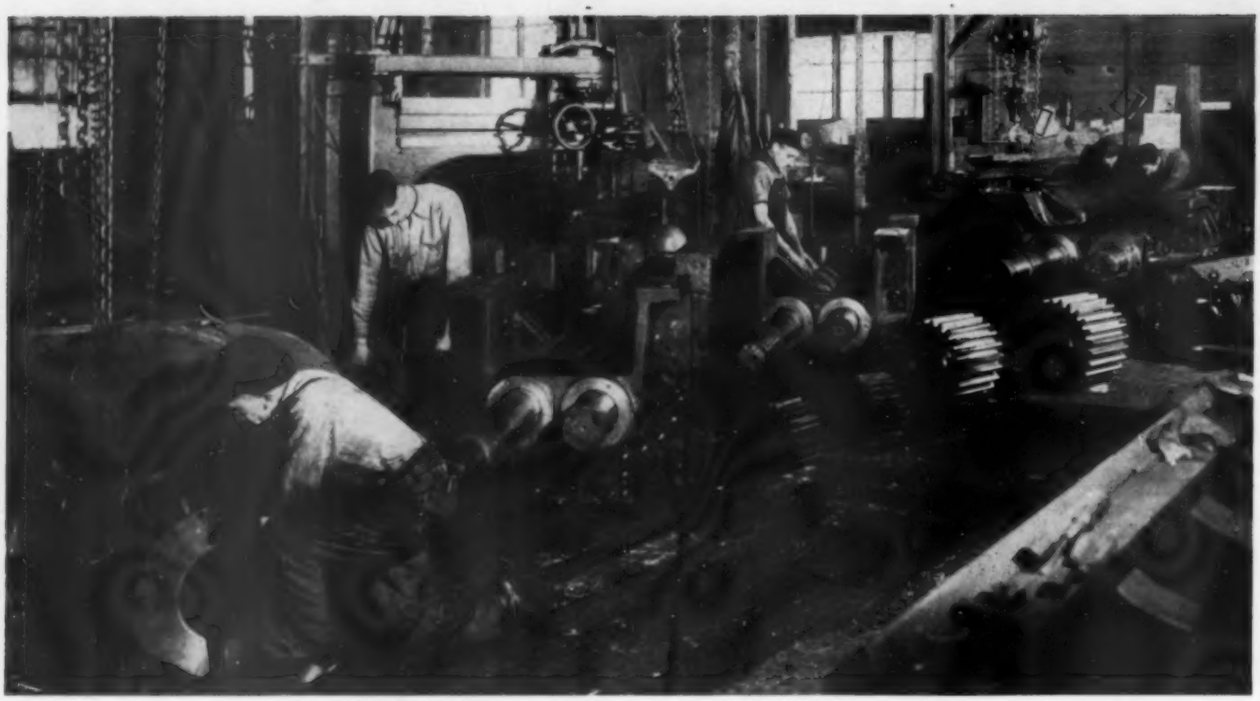
Akron Sales Office: Peoples Bank Building, Akron, Ohio • SALES REPRESENTATIVES: Ernest Jacoby & Co., Boston, Mass. • Marshall Dill, Los Angeles and San Francisco, Calif.



A Part of the *Production Line* that is assuring *faster* delivery of rubber needs to a waiting world...

SPARE PARTS URGENTLY NEEDED!

Do you have spare Banbury parts? You can help someone else by letting us buy them. They are urgently needed.

Here is part of our production line; but it is a line that extends to the processing rooms of plants making preparations now for effective speed-up of Synthetic needs . . . Faster delivery of rubber goods to a waiting world is being assured by the skilled redesigning and rebuilding of Banburys at Interstate, where production lines are going day and night to give greater efficiency to mixers . . . If your Banburys are not processing Synthetic as fast and as effectively as they should—write, wire or phone us at once.

SERVING THE RUBBER INDUSTRY

INTERSTATE WELDING SERVICE

Main Plant: 914 Miami Street . . . AKRON 11, OHIO . . . Phone: JE 7970

EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

Let us send you free

Fact File

of Monsanto Chemicals for the Rubber Industry

This file-size booklet gives you condensed data, tabulated in convenient form, on all chemicals listed below. We are sure you will find it a handy reference. Mail the coupon today for your free copy.

ACCELERATORS

- A-10
- A-19
- A-32
- A-77
- A-100
- UREKA
- UREKA BLEND B
- UREKA C
- EL SIXTY
- SANTOCURE
- THIOTAX
- THIOFIDE
- DIPHENYLGUANIDINE
- GUANTAL
- PIP PIP (Piperidine-pentamethylene Dithiocarbamate)
- R-2 CRYSTALS
- THIURAD (Tetra methyl thiuram disulfide)
- METHASAN (Zinc salt of dimethyl-dithiocarbamic acid)

ANTIOXIDANTS

- FLECTOL H
- FLECTOL WHITE
- SANTOFLEX B
- SANTOFLEX BX
- SANTOVAR O

MISCELLANEOUS

- A-1 (Thiocarbanilide)
- OXYNONE
- WETTING AGENTS
- STABILIZERS
- COLORS
- REODORANTS
- ETHASAN (Zinc salt of diethyl-dithiocarbamic acid)
- BUTASAN (Zinc salt of dibutyl-dithiocarbamic acid)

MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY
Rubber Service Department
2nd National Building,
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Please send me a free copy of your reference booklet, "Monsanto Chemicals for the Rubber Industry."

Name.....Title.....

Company.....

Street.....

City.....Zone.....State.....

For building tack in GRS (Buna S) Rubber

GALEX*

For good friction stocks

FRICTION STOCK FORMULA

GRS	100
Zinc Oxide	5
Stearic Acid	2.5
EP Channel Black	40
Sulphur	2.5
TMTMS	1.75
GALEX	40

Cure: 25 minutes at 292° F. at 45 lbs.

Tensile	1800 lbs.
Elongation	780%
Modulus	300%—400 lbs.
Duro	53

THIOKOL CORPORATION, *Trenton, N. J.*

Manufacturers of THIOKOL* *SYNTHETIC RUBBER and RUBBER CHEMICALS*

* Thiokol Corporation Trademark Reg. U. S. Pat. Off.
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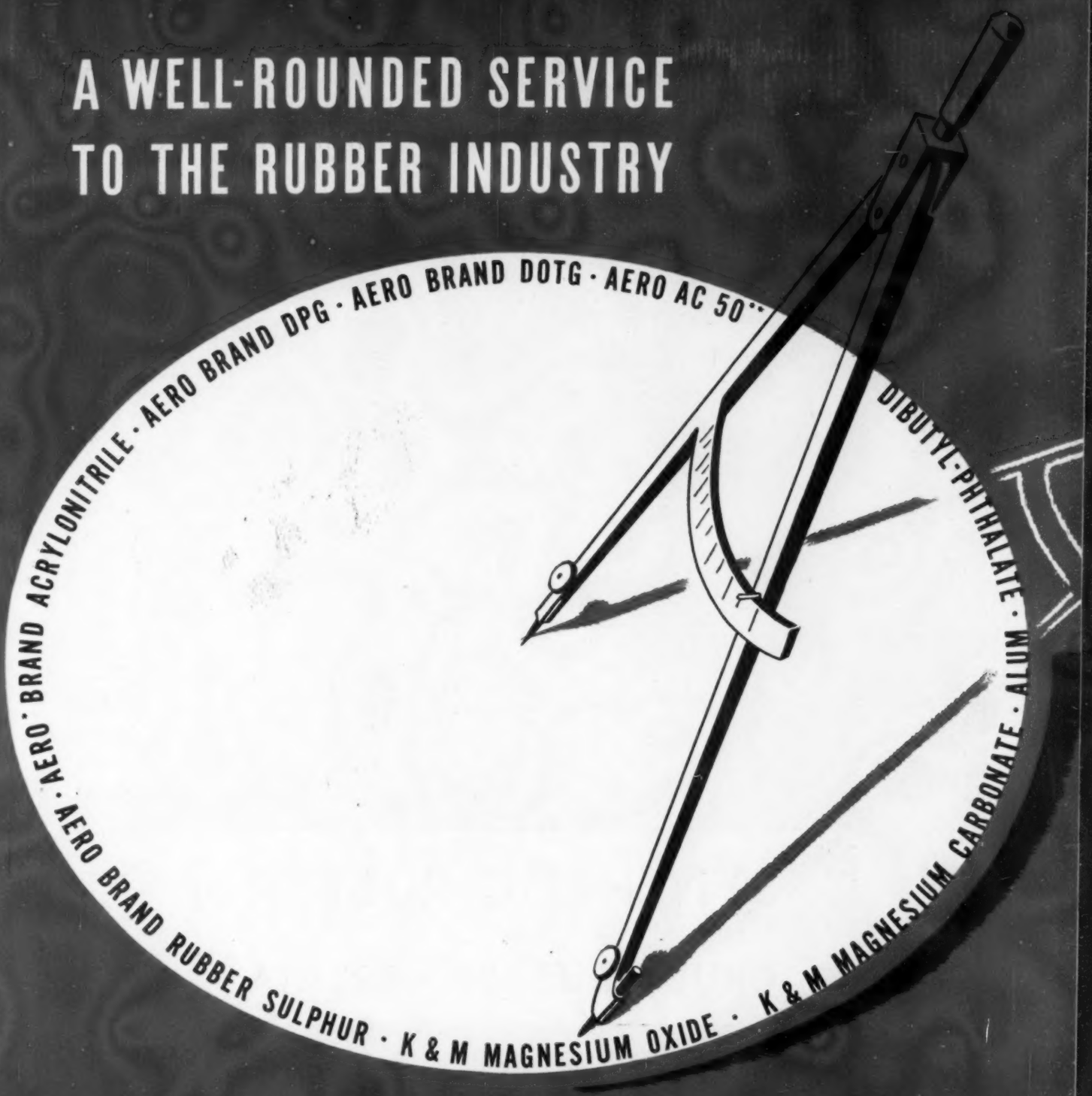
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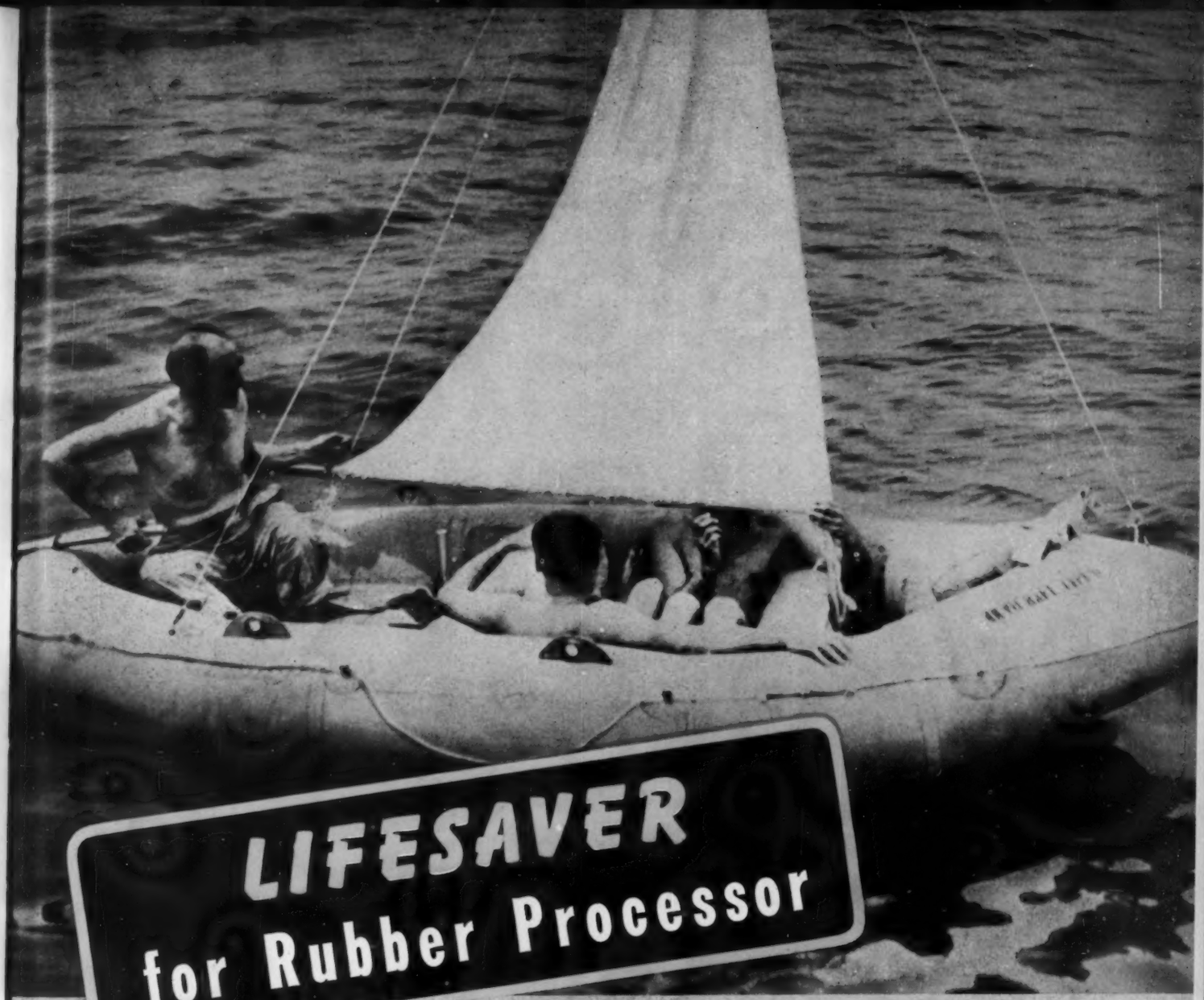

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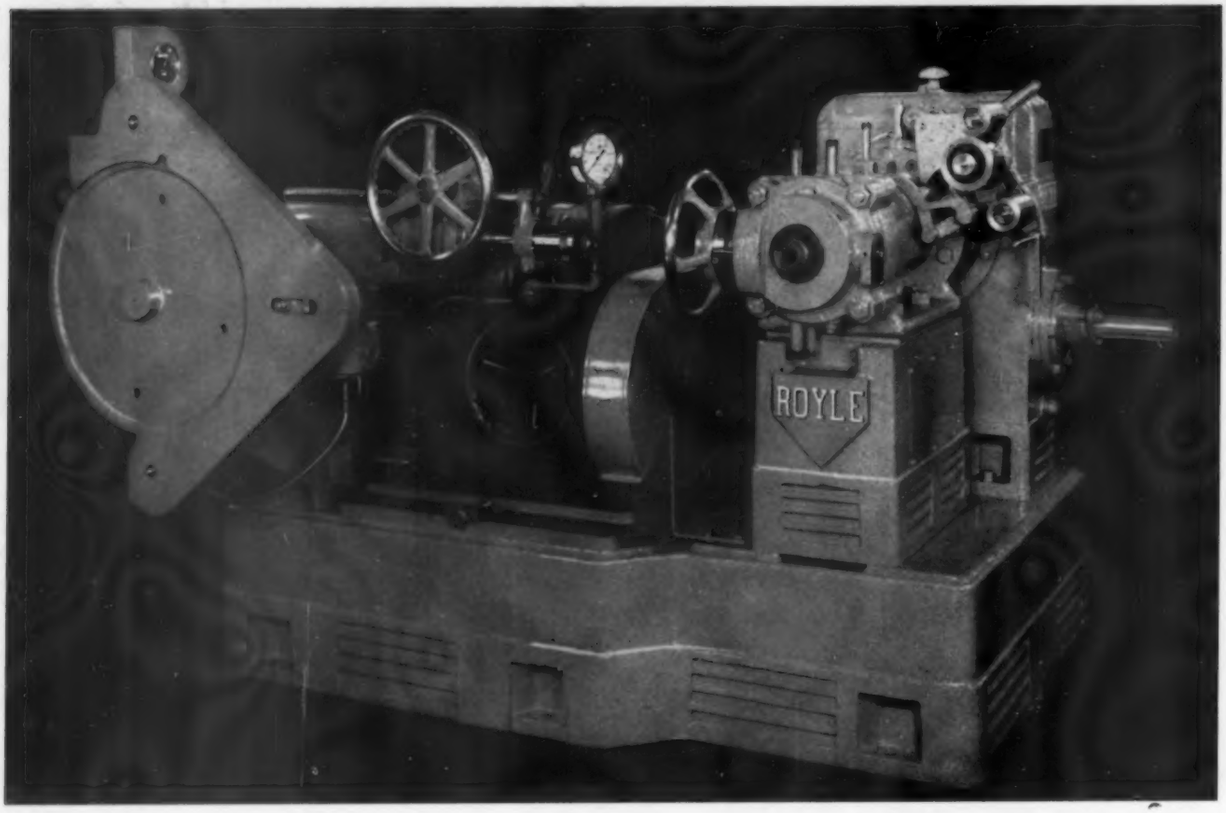

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The RUBBER AGE

VOL. 54, No. 3 DECEMBER, 1943

Review of the German Patent Literature Relating to Synthetic Rubber

By FREDERICK W. BREUER

Polymer Research Branch, Office of Rubber Director, Washington, D. C.

In the course of the activities of the Patent Unit Polymer Research Branch of the Office of the Rubber Director, it became advisable to prepare a report on the German patent literature relating to synthetic rubber. This report has been given limited distribution. Because the report has aroused considerable interest on the part of those working in the field of synthetic rubber, it has been edited and is published herewith with the approval of Dr. E. R. Gilliland, Assistant Rubber Director for Research and Development of Synthetics.—Editor.

THE industrial development and large scale production of synthetic rubbers suited for use in tire manufacture both technologically and from the economic viewpoint has until recently been undertaken for strategic reasons chiefly in Germany and in Russia. Whereas a substantial amount of scientific information has emanated from the latter country in journals, devoted exclusively to synthetic rubber, the German work has been laid down primarily in the patent literature. The German patent art being related to the "Synthetic Rubber Program" is of particular interest to those working in the field. In the present paper an attempt has been made to survey the German patents on synthetic rubber in the hope that it will prove useful to those engaged in research on synthetic rubber.

Before the first world war both the Badische Anilin und Soda-Fabrik and Farbenfabriken vorm. Friedrich Bayer and Company were engaged in competitive development work on synthetic rubber. The resumption of German synthetic rubber research about coincides with the consolidation of a large portion of the German chemical industry in I. G. Farbenindustrie A. G. It has been said that the rather confused patent situation of the preconsolidation period resulting from competitive work, has caused difficulties for I. G. Farbenindustrie A. G., successor of the Bayer Company as well as of Badische Anilin und Soda-Fabrik, in obtaining patent protection for their later work.

The general principles of modern synthetic rubber manufacture are clearly outlined in the German patent art. Still, there is perhaps no phase in industrial chemistry in which "know how" plays as big a role in making possible the establishment of technologically and economically feasible large scale production. The German patents do not disclose much of this detailed information. The more remarkable, therefore, is the rapid bridging of this wide gap.

This report surveys what is hoped to be the complete German patent art on diolefin polymers and copolymers of rubber-like properties. No clear line of demarkation exists between synthetic rubbers and rubber-like plastics. Polysulfide condensation products, disclosed

first in an Austrian patent of 1928 by a Swiss inventor, have been included in this review, as have certain vegetable and animal oil condensation products.

Perusal of a large number of German patents dealing with vinyl and acryl compounds and their polymerization products had to be undertaken and those polymers or copolymers which are described as possessing definite elastic properties have been included in this review.

The interest taken in this study by Dr. R. R. Williams and Dr. C. S. Fuller is much appreciated.

I—Mass Polymerization

The German patent art on mass polymerization of diolefins presents a thorough, though by no means methodical, development of this rather old reaction. In the main, two lines of attack of the problems were pursued: polymerization in the presence or absence of non metallic catalysts at ordinary or elevated temperatures, and sodium catalyzed polymerization. Apparently, little detailed information on the methods of manufacture of the series of numbered bunas (Buna 85, Buna 115), which represent the latest known German development of this type, has transpired into the patent literature, and, incidentally, little patent information is available on the Russian counterpart.

Polydiolefins

The first application for the discovery of alkali metal-alloy-amalgam catalyzed polymerization of butadiene, isoprene was made by Matthews and Strange, October 25, 1910, in Great Britain *(1)*, who placed the metal in the liquefied hydrocarbon. The Bayer Company patent *(2)* was filed in Germany, December 12, 1910. A British patent filed July 14, 1911, claims reaction of hydrocarbon vapors with the catalytically acting alkali metal-alloy-amalgam, to be three to four times faster than the liquid phase reaction; 3 to 5 per cent (by weight) of sodium metal are generally applied. The reaction is carried out either at room temperature or, more rapidly, at elevated temperatures.

Sodium polymerization in a carbon dioxide atmosphere for periods of more than one week at room temperature was found by Badische Anilin and Soda Fabrik *(3)* to lead to benzene insoluble products of higher technical value. (Apparently, chain growth is not interrupted as soon as in the presence of oxygen, permitting formation of larger molecules.)* A patent *(4)* granted to the same company recommends heating isoprene with sodium in a carbon dioxide atmosphere at 40 to 50° C. for about ten days.

The vapor contact polymerization of butadiene with alkali metals serves to control more readily the reaction which unpredictably becomes very violent if carried out in the liquefied hydrocarbon except if dilute diolefins are applied. The innovation of gradual addition of alkali metal reduces the time requirements to a few days, fresh metal surfaces being exposed to the hydrocarbon vapors more frequently *(5)*. A supplement *(6)* teaches the application of iron, zinc, tin, lead and nickel powders in addition to sodium, whereby the reaction time is reduced to three to four days. A further supplement *(7)* discloses the application of temperatures of 40 to 50° C. An additional supplement *(8)* applies mechanical means to continuously offer fresh metal surfaces to the diolefin. (Use of ball mills is suggested).

A short cut to the production of a rubber-like mass was suggested by Gesellschaft fur Teerverwertung *(9)* by removing sulfur from a coke oven distillate boiling below 25° C. (benzol forerun), and polymerizing with sodium in the presence or absence of ammonia. Sodium acetylides are said to precipitate rapidly and are separated, whereas butadiene forms a gel gradually. (It has been said that a Russian process can make use of very low butadiene concentrations).

The use of energy supplied by heat and light to cause polymerization of diolefins antedates the application of metal catalysts such as the alkali metals. (Friedrich Bayer and Company) *(10)*. Equal portions of butadiene and isoprene and the use of piperylene are substituted in patents *(11)* of this company. The heat polymerizate of isoprene prepared in the presence of acetic acid anhydride is stabilized by treatment with dilute aqueous ammonia or amines *(12)*, this disclosure representing an early application of polymerization inhibitors.

Friedrich Bayer and Company *(13)* disclose polymerization of butadiene and analogs by adding fresh diolefin to the sodium polymer. The claim covers also the use of natural rubber as accelerating means but no example of this method of carrying out the invention is given. Friedrich Bayer and Company *(14)* heat dimethyl butadiene with or without catalysts until the resulting polymer becomes insoluble in alcohol, but still remains soluble in benzene. Hoffmann assigned a patent *(15)* to Bayer and Company disclosing the production of a somewhat sticky synthetic rubber by heating synthetic isoprene in an autoclave to 200° C. for 10 to 12 hours. Oily material, causing stickiness, is removed by steam distillation.

The Bayer Company *(16)* stabilizes the so-called Kondakow product (polydimethyl butadiene) by treatment with bases, *e. g.*, dilute aniline, whereby changes in the polymer by oxidation or further polymerization are "short stopped." In a further development *(17)* the bases are already added to the monomer (dimethyl butadiene) prior to or in the initial stages of the polymerization. A stable rubber is formed. A different type of polymerizing agent (blood serums, starch, albumen, urea, glycerol) applied at ordinary temperature is disclosed in a patent issued to Bayer and Company *(18)*.

Stabilization and removal of oily polymers responsible for stickiness is effected according to a Badische Anilin and Soda Fabrik patent *(19)* by heating an isoprene polymer gradually to 170-160° C in a nickel vessel under pressure and in a stream of ammonia gas. By applying heat and pressure (autoclave, 150-200° C.) the polymerization time for dimethyl buta-

* Important elucidation of the mechanism of the sodium polymerization reaction has been presented by Midgley and Henne *(Journ. Am. Chem. Soc.* **51,** 1294, 1929) indicating that 1,1—, 1,4—, and 4,4— addition of isoprene molecules takes place. Ziegler *(Chemiker Zeitung,* **62,** 125, 1938, see *Rubber Chem. & Tech.*. Vol. 11, 501, 1938; also *Annalen* 542, 90, 1939) has studied the polymerization of butadiene under the influence of n-butyl lithium and phenyl isopropyl potassium. By fractionating the lower products of polymerization (C_{12} and C_{16} hydrocarbons) he has discovered that at —70° C. to about room temperature the 1,2— addition mechanism prevails, whereas 1,4— addition is preponderant at +70 to 100° C. It is assumed that the same "temperature rule" holds true for the construction principle of the higher-rubber-like polymers. Schulz *(Ber.,* **74,** 1766, 1941) has explained the temperature factor on the basis of the different activation energies for the two types of addition.

diene is reduced to 8 hours *(20)*. Traun's Forschungslaboratorium discovered (*21*) that at room temperature by increasing the pressure to from 300 to 600 atmospheres a reduction in polymerization time from four to six weeks to five to six days is secured.

Isoprene polymers are treated with surface active agents, *e. g.*, active carbon-active silicic acid according to a patent by Meisenburg to I. G. Farbenindustrie (*22*) to remove lower polymers and malodorous substances.

Reduction of Time Requirements of Polymerization Reaction

A Badische Anilin and Soda Fabrik patent (*23*) discloses the interesting observation, which is probably contemporaneous with Schorigin's work on organo metallic compounds, that the sodium-carbon dioxide polymerization product may be used to promote the polymerization of diolefins. Apparently, the active metallo-organic complex, or sufficent surface of alkali metal, are preserved in a carbon dioxide atmosphere after the polymerization is completed.

However, a later patent *(24)* discloses the catalytic effect of an isoprene polymer, which has been freed of metal. The polymerization is carried out at 40° C. and extends over four to five weeks. At room temperature longer reaction periods are required. The polymerization is much hastened by applying organo-alkali compounds (zinc sodium ethyl) instead of sodium metal for the polymerization of isoprene *(25)*, the reaction being completed in a few hours if heat is applied.

Badische Anilin and Soda Fabrik (*26*) has discovered that addition of approximately 5% (by weight of sodium) of iron filings shortens the period required for the sodium polymerization in a carbon dioxide atmosphere of dimethyl butadiene to three to four days.

As is to be expected, sodium hydride has been tested as polymerization catalyst for butadiene and according to an I. G. Farbenindustrie disclosure (*27*) it causes less violent polymerization in the liquid phase than do the alkali metals. Bayer and Company (*28*) has discovered that colloidal mercury acts as a catalyst in isoprene polymerizations.

Bayer and Company (*29*) carry out the polymerization of dimethyl butadiene in the absence of light by exposing the monomer to the Kondakow product for three or four weeks.

A novel and theoretically interesting promoting system has been patented by Boris Bysow (*30*) of Leningrad, who discovered that tautomeric substances would act as catalysts in the polymerziation of diolefins. Since the compounds listed, *e. g.*, diazoamidobenzene, phenyl isocyanate, acetyl acetone and benzoyl acetate, are soluble in the diolefin, no stirring is required. The reaction is carried out at from 60 to 100° C. Yields of approximately 50% of theory are obtained after eighteen days, if one per cent (by weight of diolefin) each of phenyl isothiocyanate and acetyl acetone are applied. The addition of turpentine acts to repress formation of dimers.

In a later disclosure the mass action law is referred to to explain this effect. This explanation is, however, not free of objections because turpentine does not contain butadiene dimers; on the other hand, appreciable amounts of dimers are known to be formed in prolonged heating of the monomer, and regardless of the possible mechanism of action, it is important that turpentine prevents or reduces dimerization of butadiene.

In a Badische Anilin and Soda Fabrik patent (*31*) it is claimed that the heat polymerization period of diolefins (isoprene) at 100° C. is reduced to five days if 0.2% sulfur (by weight of diolefin) are added. It is stated that larger quantities of sulfur not only retard and decrease the yields of synthetic rubber but cause formation of a semi-solid, sticky product. (As will be remembered, similar accelerating effects have been observed in the polymerization of chloroprene and in the emulsion polymerization with sulfur-containing modifiers).

Butyl Rubber Type Synthetics

Muller-Cunradi of I. G. Farbenindustrie (*32*) has shown that by polymerizing butadiene in the presence of dissolved, highly polymerized isobutylene by either mass or emulsion techniques the physical constants of the resulting product are superior to polybutadiene. On the other hand, by kneading a small percentage of vinyl carbazol with polyisobutylene, or by dissolving the components and heating, a material possessing more rubber-like properties than polyisobutylene is secured (*33*). Purified vinyl ether is polymerized with diolefins, isobutylene and other unsaturates under conditions similar to those applied for isobutylene to yield thermoplastic masses, which at room temperature are more elastic than rubber and resemble gutta-percha (*34*).

Polyolefins (Vistanex, Oppanol)

Mercaptans and sulfides, when added to the extent of 0.05% to isobutylene, slightly retard polymerization but yield a product of more uniform molecular weight range, performing a modifier action under conditions of mass polymerization. (I. G. Farbenindustrie and Standard Oil Development Company) (*35*).

Modifiers

The properties of diolefin mass polymerization such as the difficultly controllable polymerization rates and varying properties of the resulting product, particularly excessive stickiness or low degree of plasticity, have rather early stimulated a search for regulators and modifying agents.

Diluents have, of course, been resorted to as a means of moderating the violent metal catalyzed polymerization rates, but no special claims have been entered. Rather small quantities of reactive unsaturated compounds have been found to exert a favorable influence on the course of polymerization as well as on the yield, plastic quality and uniformity of the polymers. It seems altogether likely that in the manufacture of the more recently developed numbered buna rubbers (Buna 85, Buna 115) modifiers have been applied which tend to stop the polymerization chain when a certain molecular weight is reached.

Such compounds which react with some organo-alkali compounds, but not with others and also not with the free metal under the reaction conditions, are various ethers. Tschunkur and Bock of I. G. Farbenindustrie *(36)* apply low molecular saturated ethers (½% isobutyl-ether) and claim quantitative rubber yields after reaction periods of three to four days at room temperature. The products are said to possess high technical value.

Another I. G. Farbenindustrie patent *(37)* suggests

unsaturated ethers (vinyl-ethyl, ethyl-propenyl, vinyl-isopropyl, allyl-ethyl, propargyl-ethyl, alpha phenyl-vinyl, vinyl-cresyl, vinyl alpha naphthyl, cyclohexenyl-ether). At 40° C. a reaction period of 1½ days is given. I. G. Farbenindustrie has also patented (*38*) the use of various chlorides in quantities of 0.2% by weight of hydrocarbon, a polymerization time of three days being given (halogen compounds are known to react with organo metallics).

Similarly, carbonyl compounds (*39*) suggested as modifiers react with organo-alkali compounds. This latter I. G. Farbenindustrie patent suggests also the use of diethyl phthalate, but the quantity applied (0.2%) is, however, too small to cause appreciable plasticizing action. In another I. G. Farbenindustrie A. G. patent (*40*) 1,4-dioxane is mentioned, and a series of compounds including thiophene, hydrocyanic acid, acrylonitrile, benzyl cyanide, methyl acetylene, containing active hydrogen at least in a tautomeric form, are given as examples in a further I. G. Farbenindustrie patent (*41*).

Plauson's Forschungsinstitut, which has been doing pioneer work, patented (*42*) the use of acrolein-substituted amine condensation products in polymerizing diolefins or their semi-polymerizates at 300 atmospheres optionally under the action of ultra violet light or silent electrical discharges. Two percent amyl nitrate has been found by von Euler (*43*) to double the yield of heat polymerized isoprene, the latter being obtained from turpentine.

Uniform molecular weight polyisobutylenes (Vistanex) are produced by application of organic sulfur compounds, *e.g.*, low molecular weight mercaptans, sulfides, poly-sulfides, hydrogen sulfide and other polymerization retarding agents, according to a German patent (*35*) assigned to Standard Oil Development Company.

Processing

Lower polymers which are by-products in the heat polymerization of diolefins, particularly isoprene and piperylene, cause stickiness and impede vulcanization. Their removal cannot readily be effected by distillation and steaming. Selective solubility of the lower polymer using ethyl acetate is proposed by Heinemann (*44*). This solvent may be added prior to polymerization. Liquid polymers (*45*) can also be removed by adsorptive carbon, active silica. Apparently volatilization rates at 40 to 50° C. are considered sufficiently high to make this a practical method.

Stabilization

Badische Anilin and Soda Fabrik (*46*) realized toward the end of the last war the need of stabilizing their methyl rubber against oxidation by adding to the polymerization batch beta naphthol, nitronaphthalene, dipiperidyl. (See earlier use of ammonia and amines). Another patent (*47*) applies 1% beta naphthol to the polymer and dries at 45° C. and a supplement (*48*) supplants nitronaphthalene.

Tschunkur (*49*) patented for Friedrich Bayer and Company the use of 1% 1,8-naphthalene diamine and other aromatic or heterocyclic di- or polyamino compounds and amino hydroxy-compounds as stabilizers for the Kondakow product. Two Badische Anilin and Soda Fabrik patents (*50*) teach prevention of resinification on storage and stickiness on the mills by heating in nitrogen or ammonia to 160 to 180° C. for several hours. Another process by Ephraim (*51*) involves heating isoprene rubber with 10% sulfur, "goloshresin" (one-third rosin, two-thirds gas tar from naphthalene manufacture) to 135° C. for 3 to 4 hours in the absence of air apparently to an under-vulcanized stage.

Milling isoprene rubber with half its weight of potassium tartrate at 110 to 112° C. for 1½ hours followed by dissolving the tartrate with warm water is claimed by Badische Anilin and Soda Fabrik (*52*) to improve the plasticity of the benzene insoluble product. Another patent (*53*) of this company applies 1% of sodium alcoholate on heated rolls (100° C.) for one-half hour. A non-sticky benzene insoluble product of good durability is obtained.

In a number of examples in the preceding patents rotary type autoclaves have been mentioned. (Special claims, protecting a polymerizing vessel with highly polished interior and free of rims, have been made by I. G. Farbenindustrie (*54*). A ball mill type autoclave is suggested in a Badische Anilin and Soda Fabrik patent (*55*).

II—Emulsion Polymerization

Early Work

Emulsion polymerization technique has been evolved in a conscious imitation of nature's own procedure almost since the industrial interest in synthetic rubber was raised around 1910. The Friedrich Bayer and Company patents (*56*) apply protein material, which also is present in the natural latex and serum, as protective colloid and supply heat (60° C.) for prolonged periods.

The use of catalysts to accelerate this type of polymerization was apparently unknown at the time, and polymerization periods of from several weeks to several months were required for the process. The egg albumen, gelatin, or starch was denatured upon prolonged heating causing the polymerized isoprene to precipitate prematurely. Addition of inorganic or organic bases prevented coagulation, which latter was effected after completion of polymerization by addition of acid.

Although the greater toughness, elasticity and absence of stickiness have been observed, it is interesting to note that the development of emulsion polymerization remained in a dormant state until about 1926, when work toward the evolution of a practical synthetic rubber-like material was resumed in Germany.

The accelerating effect of nitrogen pressures of the order of 300 to 600 atmospheres on emulsion polymerization rates of butadiene at room temperature is noted in a patent by Traun's Forschungslaboratorium (*57*) in 1918, but this process is obviously not of practical interest.

Post War Development

The renewed period of activity in German synthetic rubber research began about 1925-26. It saw further development of mass polymerization, resulting in the numbered buna rubbers. It was logical that the first patents in this second phase of the development of emulsion polymerizates should be directed toward shorter reaction periods. Bock and Tschunkur (*58*) were able to show that air, oxygen and peroxides when applied to the recipes developed around 1912 caused a

reduction of polymerization periods to three to four weeks, but more impressive were results with those batches containing dimethyl butadiene, either alone or with other diolefins, in which cases reaction times of from several days to two weeks are reported.

Tschunkur and co-workers (*59*) discovered that finely divided or colloidal heavy metal oxides, which do not contain peroxidic oxygen, *e.g.*, manganese dioxide, lead dioxide, silver oxide, will catalyze polymerization. Butadiene and isoprene are polymerized by a 1% aqueous colloidal solution of manganese dioxide at 60° C. in about one week, giving a 60% yield of rubber. Even shorter periods are reported for isoprene polymerization.

It is worthy of note that in common with the peroxidic catalysts suggested earlier, the promoters given in this patent are rather strong oxidants. In one example with isoprene, a 1% solution of potassium permanganate is applied. This compound is known to cause formation of the tetrahydroxy derivatives.

Pummerer (*60*) has discovered that the polymerization of isoprene is hastened by exposure to light in the presence of small quantities of carbonyl compounds (eosin).

Glue and skim milk are suggested as emulsifying agents in an I. G. Farbenindustrie patent (*61*) for which application was made in 1927. The aqueous phase represents only about 25% of the total emulsion volume. When polymerization (hydrogen peroxide catalyst) is complete, a cream-like upper stratum forms, which is separated and worked up. Coagulation does not appear to be required in this early process. Salts of complex organic bases (*e.g.*, diethyl aminoethyl-oleyl amide hydrochloride) are suggested as emulsifying agents for polymerizations in acid media by I. G. Farbenindustrie (*62*). After several days reaction at 65° C. a quantitative yield of polymer is formed.

Increased polymer yields are claimed by Lecher of I. G. Farbenindustrie by applying a system of two emulsifying agents (*63*), one of which serves to emulsify the hydrocarbon in water (*e.g.*, sodium oleate), the other (magnesium oleate) for emulsification of the aqueous medium in the hydrocarbon; the reaction is complete after ten days at 60° C. Also, reducing the average particle size of the emulsion by homogenizing (*64*) has been recommended. Various oleates, turkey red oil, saponin and Marseilles soap in conjunction with buffer solutions to maintain a pH of 4 to 8.5 have been applied (*65*). Polymerized castor oil is suggested in another I. G. Farbenindustrie patent (*66*). It is emulsified in water by efficient agitation in the presence of ammonia and the stiff emulsion combined with isoprene. With hydrogen peroxide catalyst polymerization is complete in three days at 60° C.

A somewhat different approach has been followed by Tschunkur and Bock of I. G. Farbenindustrie (*67*), who have discovered that if the reactants are barely moist, and emulsion in the common sense of the word does not take place, because the batch is not stirred, polymerization still proceeds, where as with dried reactants a polymer cannot be obtained. (The process has been shown in the example to operate with butadiene-styrene and other comonomers). An advantage of such a process obviously is economy of space and simple processing problems in that coagulation, drying, etc., is avoided. The process is, however, time consuming (ten days at 60 to 70° C.) and if pushed by application of modern catalyst and accelerator systems the heat evolution can probably not be readily controlled.

Interruption of the emulsion polymerization of butadiene with hydrogen peroxide or benzoyl peroxide catalyst in an ammoniacal medium after three days at 40° C. is disclosed in an I. G. Farbenindustrie patent (*68*), 20 to 30% diolefin remaining unreacted. A more plastic product is obtained. The polymerization is short stopped by coagulation or inhibitors.

A polymerization recipe (*69*) applying 10 kg each of dimethyl butadiene and butadiene emulsified in 20 liters of water with 1 kg sodium stearate, 0.75 kg glue and 0.25 kg sodium isobutylnaphthalene sulphonate at 60° C. for eight to ten days represents the state of the art around 1929. It is stated in the disclosure of this patent that dimethyl butadiene polymers possess nerve and plasticity but lack elasticity and cold resistance, whereas butadiene and isoprene are characterized by good elasticity and cold resistance but are deficient in nerve and plasticity.

Bock and Tschunkur (*70*), supplement to German patent 578,965, propose the use of 20 to 60 parts by weight of silica gel, magnesium carbonate, Dixie clay and other fillers of a degree of fineness

$$\left(= \frac{\text{weight of 1 cc}}{\text{specific weight}} \right)$$

of under 0.3 micron instead of carbon black as reinforcing agents.

Copolymerization

The principle of emulsion copolymerization of diolefins and vinyl aromatics is laid down in an I. G. Farbenindustrie patent (*71*) by Tschunkur and Bock, filed 1929. It is recognized that in order to obtain elastic properties the diolefin must be present in large excess, although with 50% by weight of styrene a soft rubber-like material is obtained. The products obtainable are superior to mechanical mixtures of the comonomers. It is stated that partially polymerized monomers may be applied. The example, however, does not teach the mode of execution of this variation of the process.

Butadiene, isoprene, dimethyl butadiene, styrene, alpha-methyl styrene, divinyl-benzene are mentioned in the examples given. The polymerization is carried out at from room temperature up to 60° C. with approximately equal volumes of aqueous solutions of emulsifying agents, *e.g.*, sodium stearate, glue sodium mono or diisobutyl naphthalene sulfonate, diethyl amino ethyl oleyl amide, or the allied aniline chlorohydrate. The polymerization period is stated to be several days; no catalysts are given in the examples though electrolytes and oxidants are mentioned in the disclosure. The claims cover the production of valuable synthetic rubbers by emulsion polymerization of mixtures of diolefins or their "incomplete" polymers with olefin benzenes, and ring or side chain substituted homologs or their "incomplete" polymers as well as impure technical mixtures of olefin benzenes, the diolefins or their polymers being applied in excess.

A supplementary patent (*72*) discloses and claims better yields (90% and higher) with alpha vinyl naphthalene. By reversing the diolefin vinyl aromatic hydrocarbon ratio hard but elastic polymers, relatively insoluble in benzene, are obtained (*73*). The products are said to be stable against chemical attack. Higher temperatures up to 150°C. and benzoyl peroxide catalyst are applied, quantitative yields being obtained

after two or more days. The same inventors (*74*) find that a vulcanizate with 50% carbon black possesses a tensile strength of 200 to 300 kg/cm² (2800-4200 lbs./sq.in.) and elongation of 600 to 700%.

Diolefin acrylonitril and homologous nitril copolymers were patented by Konrad and Tschunkur for I. G. Farbenindustrie (*75*), the emulsion polymerization of acrylic acid derivatives having been claimed somewhat earlier (*76*). The ratios of comonomers and polymerization conditions are patterned after those disclosed for butadiene-styrene copolymers. Another comonomer type possessing a system of conjugated unsaturated linkages with a participant other than carbon is an alpha unsaturated ketone. Methyl methylene ethyl ketone and benzalacetone are claimed by I. G. Farbenindustrie (*77*) to produce a higher degree of plasticity if copolymerized with butadiene or isoprene.

Alpha unsaturated ketones had been shown earlier by Friedrich Bayer and Company (*78*) to autopolymerize, a process which could be accelerated by oxygen or peroxides (*79*). I. G. Farbenindustrie (*80*) claims rubber-like polymers, which are insoluble in organic solvents and lubricating oils, by polymerizing mixtures of butadiene hydrocarbons and substituted vinyl ethinyl carbinols.

Vinyl esters of higher fatty acids (palmitic, stearic, oleic, etc.) cause accelerated polymerization of vinyl acetate, even if present only to the extent of a few per cent. The copolymers are said to be resistant against water and cold. Claims cover the copolymerization of diolefins with vinyl esters of acids with more than four carbon atoms but no example other than copolymerization of various vinyl-esters is given (*81*).

Hopff of I. G. Farbenindustrie (*82*) has modified natural rubber by either mixing Hevea latex with an emulsion of a vinyl polymer, or by polymerizing a vinyl compound in Hevea latex and coagulating with aluminum sulfate.

Modifiers

Emulsion polymers suffer in the non-vulcanized state from a lack of plasticity, solubility, and tack. Organic hydrazine derivatives (*83*) added in small quantities (1%) to butadiene are claimed to improve solubility and processability of butadiene polymers. Chlorinated hydrocarbons (carbon tetra chloride, dichloroethylene, hexachloroethane) and water soluble chlorine compounds, *e.g.*, chlora-hydrate and trichloroacetic acid, are the first reference on record (*84*) of the accelerating, modifying and desensitizing effect of chlorinated compounds. The retarding effect of impurities in the monomers of technical grade is eliminated and plastic properties of the rubber are markedly improved. I. G. Farbenindustrie (*85*) disclose the addition of tertiary amylphenol disulfide or phenyl beta naphthyl amine as a benzene solution to Buna S emulsion. The coagulum becomes stabilized and after vulcanization the product possesses superior tensile strength, elongation, plasticity and stability against discoloration when exposed to illumination.

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* The meaning and importance of the dates of application for a German patent differs from that of U. S. Patents in that the period during which a German patent remains in force begins one day after its filing and ends after eighteen years. Supplementary patents expire on the same date as the main patent but are not invalidated by cancellation of the latter.

(To be concluded in the January, 1944, issue)

Effect of Small Amounts of Guayule Rubber on GR-S Compounds

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PLANS for the production of domestic guayule rubber have fluctuated widely in the last two years. At the present writing the domestic guayule program has been drastically curtailed. Despite this an appreciable amount of guayule is and will continue to be available to the rubber industry. During 1943 we will import about 7,000 tons of guayule from Mexico and in late 1944 and 1945 this amount should be augmented by several thousand tons of the domestic product. Although these quantities are small compared with our total rubber requirements, they are sufficient to allow the mixing of guayule in small percentages with GR-S for many products.

Guayule is high in natural resin and is quite tacky and thus appears to be a logical material to improve the tack and processing of GR-S. The experiments described below show the effect of 5, 10 and 20% of guayule on two typical GR-S channel black stocks containing respectively Continental AA (EPC) and Continental A (MPC) *(1)*.

The base formula used was as follows:

GR-S plus Guayule	100.
Zinc Oxide	5.
Bardol	5.
Sulfur	2.
Sodium Acetate	0.5*
Captax	1.5
Carbon Black	50.

* Per 100 guayule.

Field of two-year old irrigated guayule.

The stocks were milled in accordance with previously described procedure for GR-S *(2)* and were cured at 307° F.

Domestic underesinated guayule was used throughout. This material has been reported *(3)* to contain about 16% resin and other acetone soluble materials. For the series of stocks listed in Table I, Naugatuck GR-S was used.

Sodium acetate has been found by other investigators to activate the cure of guayule and was used in the above formula for this purpose.

Rubber tests are presented in Table I. The cure giving best tensile strength is in all cases close to 65 minutes. In Figures 1 to 4 the more important properties are plotted at this cure.

Stress-Strain Behavior: As shown in Fig. 1, tensile for the Naugatuck GR-S is increased by the replacement of five parts of GR-S with guayule, while the

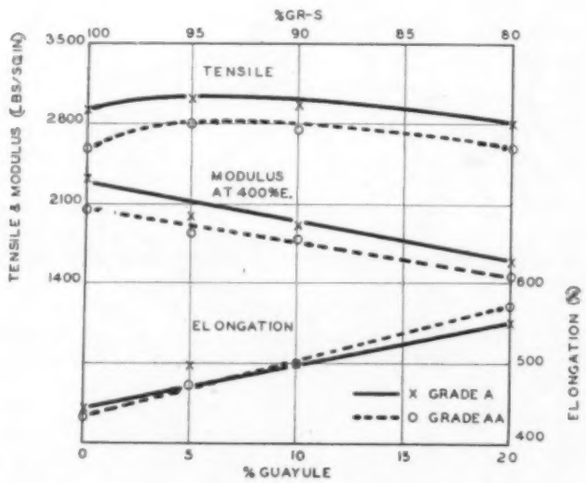

Fig. 1

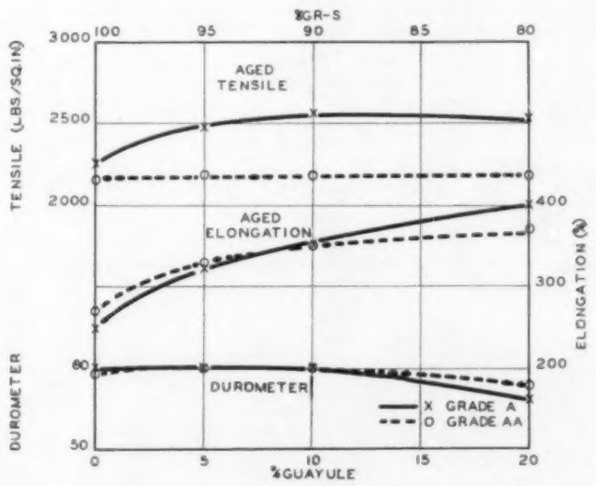

Fig. 2

TABLE I

Carbon Black / GR-S : Guayule Ratio	Cure Time	Cont. A 100:0	Cont. A 95:5	Cont. A 90:10	Cont. A 80:20	Cont. AA 100:0	Cont. AA 95:5	Cont. AA 90:10	Cont. AA 80:20
Modulus	30′	1735	1525	1410	1335	1550	1440	1400	1325
at 400%	45′	2075	1750	1675	1500	1850	1675	1500	1400
Elongation	65′	2325	1950	1900	1600	2075	1875	1800	1450
(lbs./sq. in.)	90′	2450	2000	1950	1675	2235	1925	1800	1550
Tensile	30′	2660	2725	2750	2700	2275	2465	2500	2450
at Break	45′	2875	2900	2800	2800	2550	2725	2650	2550
(lbs./sq. in.)	65′	2925	3125	2850	2800	2600	2800	2725	2575
	90′	2900	2900	2480	2675	2335	2625	2450	2535
% Elongation	30′	520	565	590	615	505	550	580	600
at Break	45′	475	530	540	570	480	530	555	590
	65′	440	525	480	550	430	470	500	570
	90′	415	500	460	525	415	460	485	540
% Breaking Set[a]	30′	12	17	19	20	13	18	18	20
	45′	10	15	15	15	10	14	14	20
	65′	7.5	13	10	15	8.8	10	10	18
	90′	5.0	10	7.5	13	5.0	10	10	15
Aged Tensile[b]	45′	2420	2360	2360	2520	2080	2160	2260	2260
(lbs./sq. in.)	65′	2240	2480	2540	2520	2150	2180	2180	2180
Retention of	45′	85	82	84	90	82	79	85	89
Original Tensile (%)	65′	78	79	89	90	83	78	80	85
Aged Elongation (%)[b]	45′	275	280	310	370	300	310	340	350
	65′	245	325	345	400	275	320	350	375
Shore Durometer	30′	62	62	60	61	59	61	64	61
at 25° C	45′	64	63	65	64	61	64	65	62
(Instantaneous	65′	65	65	65	60	63	64	64	63
Reading)	90′	65	65	66	60	62	65	65	63
Shore Durometer	30′	58	56	55	55	55	57	60	55
at 25° C	45′	60	59	60	59	58	60	61	56
(30″ Reading)	65′	60	60	60	56	59	60	60	57
	90′	61	60	62	55	59	60	61	58
Tear	45′	300	300	370	370	310	325	290	350
(lbs./in.)	65′	280	345	345	375	300	325	365	335
Abrasion Loss[c]	65′	126	163	189	281	164	182	208	276
(cc/Hp-hr.)	90′	125	168	184	288	153	191	208	288
Rebound	30′	32	30	31	27	34	34	34	27
at 25° C (%)[d]	45′	32	31	32	27	34	35	34	29
	65′	31	31	31	27	35	35	34	30
	90′	31	31	31	28	36	34	33	31
Flex Crack Growth (kilocycles/cm)[e]	85′	10	22	26	27	18	27	38	58
Tubing Rate (gms./min.)[f]		22.8	23.6	24.7	25.3	26.0	25.8	26.0	27.6
Williams Plasticity (inches)		.263	.227	.210	.201	.220	.214	.200	.186
Tack[g]		None	Very Slight	Slight	Fair	None	Very Slight	Slight	Fair

(a) Measured at least one hour after break. (b) Aged 24 hours in air oven at 100° C. (c) DuPont abrader with a Norton Crystolon (#3746-15) wheel. (d) On four plies of tensile sheets by Bashore resiliometer. (e) A DeMattia flexing machine (A.S.T.M. D-430-40-B) was used. Results are expressed as the number of kilocycles (thousand flexures) required to increase an 0.2 cm. initial cut to 1.2 cm., i.e., a growth of 1 cm. All results are the average of two separate tests. (f) One-half inch Royle Tuber 5/32″ die, 32 r.p.m. screw speed. (g) Estimated by hand on cold uncured sheets 24 hours after milling.

TABLE II

Carbon Black / GR-S : Guayule Ratio	Cure Time	Cont. A 100:0	Cont. A 95:5	Cont. A 90:10	Cont. A 80:20	Cont. AA 100:0	Cont. AA 95:5	Cont. AA 90:10	Cont. AA 80:20
Tensile at Break	30′	2050	1875	2075	2050	1475	1675	1800	1700
(lbs./sq. in.)	45′	2100	2125	2325	2150	2000	1975	1950	2075
	65′	2125	2300	2350	2200	2200	2000	2000	2000
	90′	2400	2125	2300	2300	2075	2100	2125	2000

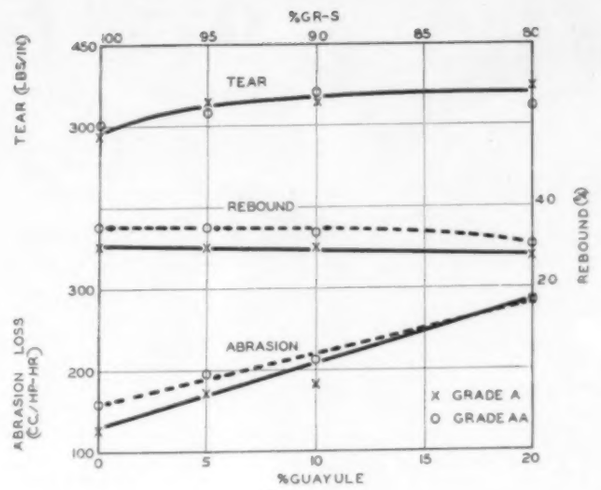

Fig. 3

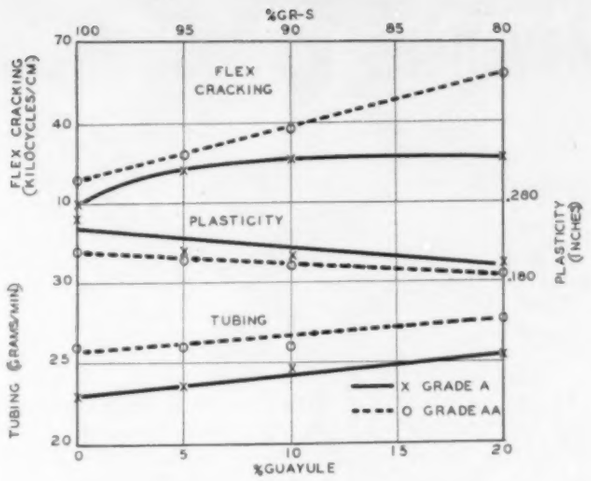

Fig. 4

use of larger amounts of guayule causes the tensile to drop.

In Table II tensile values for the same set of stocks using GR-S from another source are given. The results are several hundred pounds per square inch lower than in Table I and show no appreciable trend in tensile with increasing guayule.

It is worth noting that the tensile for Grade A is several hundred pounds greater than for Grade AA for all blends and for both types of GR-S.

Modulus is decreased by the addition of guayule and elongation is increased. Grade AA has lower modulus and higher elongation than Grade A for most of the blends.

Breaking Set: Breaking set increases slightly with increasing percent of guayule. Grades AA and A give equivalent results.

Resistance to Heat Aging: Stocks were aged twenty-four hours in air at 100° C. Aged elongation and also per cent retention of the original elongation increase as the amount of guayule in the blend increases. Tensile values also appear to indicate slightly better aging for the blends containing guayule. Tensile and elongation results are plotted in Fig. 2.

Durometer: Likewise in Fig. 2, the durometer reading 30″ after application of pressure is plotted. The readings indicate that hardness is not affected by guayule content up to 10% guayule. However, addition of 20% guayule produces a softer stock. Instantaneous durometer readings given in Table I show the same behavior.

Tear Resistance: Tear increases slightly with increasing guayule content. No appreciable difference was observed between AA and A (Fig. 3).

Abrasion Loss: Abrasion loss increases steadily as the amount of guayule is increased (Fig. 3). The difference between Grade AA and A is not large, but Grade A shows the lower loss for most of the blends.

Rebound: Rebound at 25° C. as indicated in Fig. 3 is constant up to 10% guayule, but falls off at 20%. Grade AA gives appreciably higher resilience than A for all blends. Rebound at 100° C. as determined on another series of stocks not included in this paper shows the same general trend.

Flex Crack Growth Resistance: Resistance to flex crack growth as indicated by the number of kilocycles required to increase an 0.2 cm. initial cut to 1.2 cm. is plotted in Fig. 4. The resistance increases appreciably with addition of guayule. Even as little as 5% guayule causes an increase of 50 to 100% in the resistance to crack growth; 20% produces an increase of about 200%.

Grade AA gives higher resistance to crack growth than Grade A for all blends.

Tubing and Plasticity: These properties are plotted in Fig. 4. The trends indicate that ease of processing increases as the guayule content increases. As might be expected AA tubes somewhat faster and is softer (lower Williams plasticity) than Grade A for all blends. However the stocks containing guayule appear to show less difference between AA and A than does the straight GR-S stock.

The appearance of tubed stocks was quite similar for all samples; however, the stocks containing guayule seemed to show slightly less shrinking than the pure GR-S stocks.

Tack: As noted qualitatively in Table I tack increases steadily as the amount of guayule increases. The difference in tack due to as little as 5% guayule can be quite readily noticed; however, even the stock containing 20% guayule has somewhat less tack than natural rubber.

The effect of 5, 10, and 20% of domestic underesinated guayule in GR-S channel black stocks containing respectively fifty parts of Continental AA and fifty parts of Continental A has been determined. The addition of guayule improves tack and processability. The cured stocks are less stiff, more elastic and have better resistance to heat aging and flex cracking; however, abrasion resistance as determined on a DuPont abrader is lower.

Stocks containing 5% guayule also appear to improve tensile of GR-S from some sources. The addition of 5% guayule to GR-S for some products is possible even with the present availability of guayule, and may be of practical interest.

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Advances in Rubber During 1943

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WAR censorship has kept information on many of the technological advances made in 1943 from public knowledge. Paradoxically, however, one of the greatest of these advances is an achievement unparalleled in U. S. industrial history which was so successful that widespread publicity, rather than secrecy, has been the rule. The Baruch report *(1)*, dated September 10, 1942, disclosed, among other things, the fact that unless seemingly impossible quantities of synthetic rubber were produced during 1943, the entire course of the war might easily be altered.

Some privately-financed and government-owned synthetic rubber plants were already in production at the time of the release of the Baruch report, though the total amount of synthetic rubbers of all types actually being produced was probably under a rate of 50,000 tons per year. Extensive plans too had been made for the building of huge plants, at the time of the release of the report.

Standard Design Plant Established

A "standard design" copolymer plant with an annual capacity of 30,000 tons, had been established, based on experiences gained in the plants already in production. A sufficient number of these standard plants to produce the required total amount of synthetic rubber was then scheduled, and construction on some of these was begun as early as September, 1942.

Announcements of the completion dates of these and related butadiene and styrene plants began to appear early and continued throughout the year *(2, 3, 4, 5, 6, 7, 8, 9, 10)*. The largest of the copolymer plants *(10)* is scheduled to produce GR-S at the rate of 120,000 long tons annually. This is equivalent to approximately 600,000 acres of rubber plantation, each acre of which has about 120 trees and each tree requires 150 tappings per year.

The latest available public report on production of synthetic rubber was given by Col. Bradley Dewey at the 106th meeting of the American Chemical Society held in Pittsburgh, Pa., Sept. 6 to 10, 1943. It was reported there that two-thirds of the annual scheduled production of 850,000 long tons of synthetic rubbers had already been completed and that there was every assurance that all plants would be in operation by the end of the year. Thus, this nation near the end of 1943 is already past the danger it once faced of complete collapse of both military and domestic fronts caused by the lack of an adequate supply of "rubber."

The credit for this splendid record of achievement must be shared by research scientists of the rubber, petroleum and alcohol industries and a large group of chemical, construction, design and mechanical engineers. As a result of the combined efforts of the above mentioned groups, this country has been able to design, construct and put into production, within a time of about two years, plants for the manufacture of synthetic rubbers at an annual rate which greatly exceeds our normal, over-all consumption of natural rubber in any year previous to the war. Evidence that this truly remarkable achievement has been recognized is found in the fact that the American synthetic rubber industry received the 1943 Award for Chemical Engineering Achievement.

Although the primary problem of obtaining an ample supply of rubber has been solved in 1943, many other problems have not been so fortunately concluded. Manpower shortages, shortages of manufacturing equipment and manufacturing capacity are some of the unsolved problems outside of the scope of this report which make conservation of manufactured rubber goods (particularly passenger car tires) mandatory in spite of the present adequacy of supply of raw synthetic rubber. Still other problems have been the object of many intensive researches, only a few of which, however, have been published.

Search for Substitutes Continues

The search for natural rubber substitutes other than GR-S continued during 1943. The commercial production of Agripol, a synthetic, rubber-like material, was announced late in 1942 *(11)*. This material is one of a class of "chemurgic rubbers" such as Norepol, Vulprene and Sulprene which are essentially derivatives of fatty oils. An excellent article giving the properties, uses, limitations, etc., of this type of synthetic rubber has been published *(12)*. Other chemurgic rubbers introduced were Kem-Pol *(13)* and Witcogum *(14)*. It is claimed that no critical chemicals or equipment are used in the manufacture of the latter two, but like the others they can only be considered a substitute for rubber in applications where low elongation and low tensile properties can be tolerated.

An interesting new development was revealed in the announcement *(15)* that sponge rubber could be produced from some of these chemurgic rubbers. Although inferior to natural rubber sponge in flexibility and compressibility at normal temperatures, it is claimed to be superior in these properties at low temperatures. A somewhat different polyester rubber (named Paracon) was also developed and is in limited production as a

Note: This report was presented by the author at the annual meeting of the Rubber and Plastics Group of the American Society of Mechanical Engineers held in New York City on December 1-2, 1943.

specialty rubber *(16, 17)*. The tensile and elongation of Paracon are reported to be higher than those of the other chemurgic rubbers mentioned, though no details have been released as to the maximum attainable values of these properties.

A considerable number of non-chemurgic rubber substitutes were also introduced. Although some of these products do not even possess the principal characteristic properties of rubber (high extensibility and tensile strength) their use, wherever possible, resulted in the saving of a considerable quantity of natural rubber. Among these might be mentioned: Bubblefil *(18)*, an interesting substitute for sponge rubber or Kapok, made of cellophane; Haydenite *(19)*, a plastic coating material for raincoats having a polyvinyl butyral base; wool felt *(20)*; cattle hair felt *(21)*, a shock-absorbent material used for padding the interior of tanks; Styraloy *(22)*, a synthetic hydrocarbon elastomer said to possess excellent low temperature flexibility and electrical properties; Synflex FT-11 *(23)*, and Marvinol *(24)* a thermoplastic material reported to be completely reclaimable and to have excellent air retention properties which make it superior to natural rubber for use in inner tubes.

Superiority of Substitutes Reported

In the field of adhesives, bonding materials and tank linings, many of the rubber "substitutes" are proving vastly superior to the natural material. Cycleweld *(25)* and Reanite *(26)*, bonding processes based on the use of synthetic materials, are reported to produce higher strength bonds between materials of a more diverse nature than had previously been found possible with natural rubber. Substitution of this type of bonding for rivetting in certain aircraft and tank applications results in a large saving in man-hours and material. The post-war possibilities of this significant advance appear almost unlimited. Details of the Redux bonding process *(27)*, announced by the British, are being kept secret and are available only to those engaged in essential war work. A new adhesive to replace rubber has been announced *(28)* for use on masking paper. The results of extensive tests on synthetic rubber cements of various kinds have been published *(29, 30)*.

Literally scores of materials were introduced to the rubber industry, especially in the early months of 1943, as means of overcoming some of the shortcomings of GR-S (low plasticity, low tack) or to "extend" the limited supplies of both GR-S and natural rubber. All of these materials were reportedly made of non-critical chemicals; some served double purposes such as plasticizer and tackifier or tackifier-extender, etc.

Typical of such materials are: Turgum *(31)*—plasticizer and tackifier; Falkomer *(32)*—extender and plasticizer; Synthol *(33)*—tackifier and plasticizer; Plastac *(34)*—processing aid; Galex *(35)*—plasticizer; Thiokol TP-90 *(36)*—a low temperature plasticizer; Syntac *(37)*—plasticizer; Plastender *(38)*—a reinforcing type plasticizer; Estac *(39)*—tack producing plasticizer; Polymel *(40)*—plasticizer, softener, extender and general processing aid; Norab *(41)*—extender; Oroplasts *(42)*—plasticizer and extender; and JMH *(43)*—peptizer for GR-S.

The evaluation of this long (though necessarily incomplete) list of materials imposed a serious burden on the testing facilities of the rubber industry, and particularly those of the smaller rubber manufacturers. It is expected that as the supply of GR-S increases, the necessity for using some of these materials (especially the "extender") will decrease proportionately, as is to be expected.

A significant advance in tank linings was marked by the announcement of synthetic rubber linings for concrete gasoline tanks *(44, 45)*. The use of this lining overcomes the tendency of the concrete to crack and allow the gasoline to escape and also prevents the gasoline (particularly high octane fuel) from the deterioration which would result from direct contact with concrete. Conservation of steel, vitally important in 1943, was thus effected and underground concrete tanks became practicable—an obvious advantage for storage at military depots. Another specialty lining announced was Synflow *(46)*.

Although some of the synthetic rubbers, and particularly GR-S, are quite similar to the natural rubber products, nevertheless some very fundamental differences in physical properties and chemical reactions exist. The effects of various pigments, concentration of pigments, sulfur content, type and amounts of accelerator, antioxidant, softener, activators, etc., on natural rubber vulcanizates all had been thoroughly investigated in continuing researches extending over a period of a number of years. The high state of excellence of the many rubber products was a direct result of the full use of this large fund of information. If the best possible products were to be made from the substitute raw materials, it was imperative that a similar fund of data be accumulated quickly. Intensive researches were begun and a vast amount of information was freely interchanged at industry-wide committee meetings. Much the largest share of this information was never published in the literature, but was simply handed out to the industry representatives at the various meetings, in the form of mimeographed, confidential reports. As a result of this action, full use of all existing test facilities was made to advance synthetic rubber technology speedily to a high degree during the year 1943.

Significant Papers Published

A number of significant papers were published, supplementing the data distributed through committees. These include articles on accelerators *(47)*, sulfur behavior in GR-S contrasted with that in natural rubber *(48)*, blending of various synthetics *(49, 50)*, compounding of GR-S *(51)*, of Guayule rubber *(52, 53, 54, 55)*, of Butyl rubber *(56)*, manufacturing and processing of synthetic rubbers *(57, 58)*, the effects of various carbon blacks on the various synthetics *(59, 60, 61, 62)*, synthetic cable insulation *(63, 64, 65, 66, 67, 68)*, zinc oxide as a pigment *(69)*, and densities of synthetics *(70)*.

Similar significant advances have been made in the field of measurement of physical properties of synthetics. New techniques have been developed for the measurement of cut growth *(71)*, heat generation *(72)*, swelling *(73)*, resilience *(74)*, and flex cracking *(75)*. The tear resistance of GR-S vulcanizates after coming into contact with petroleum products has also been investigated *(76)*.

In general, each of the synthetics excels in some one (or more) characteristic property. Papers illustrating such unique properties *(77, 78)* have assisted the tech-

nologist in choosing a particular type of synthetic rubber for a given specialty application.

New uses for semi-conducting rubber (commercially used for the first time in reducing or eliminating static shock on passenger buses) are being found almost daily. Its most recent application is in a new type of de-icing device *(79)*. In addition to the unpublished committee reports on this subject, excellent papers on the effect of carbon black particle size on conductivity *(80)* and the conducting properties of neoprene *(81)* have been published in 1943.

The physical and mechanical properties of rubber at low temperatures have been the subjects of laboratory investigations for a number of years, though no satisfactory test or evaluation technique had been developed. The substitution of synthetics (some of which became hard or even brittle at relatively high temperatures) in combat vehicles for natural rubber made it necessary to develop new ways of evaluating the low temperature properties of all the elastomers.

Test Techniques Described

Descriptions of a number of test techniques were published *(82, 83, 84, 85, 86, 87, 88, 89, 90)*, testifying to the importance of this phase of rubber technology in the war effort and to the extremely rapid advances effected. Additional descriptions of new tests were disclosed in papers (as yet unpublished) presented at the Fall meeting of the Division of Rubber Chemistry of the American Chemical Society (see abstracts of papers in RUBBER AGE [N. Y.], issue of September, 1943).

Although the need for passenger car tire replacements is still great, the disappointing results of the extensive 1942 search for an "interim tire" left almost no hope for even a partially good solution in 1943. A suggestion for reclaiming millions of passenger car inner tubes was made near the beginning of 1943 *(91)* but apparently the disadvantages of tubeless tire operation outweighed the advantages to be gained by adding these millions of tubes to the already huge, unprocessed scrap rubber piles, so that no action was taken by the authorities. A carpet-like material impregnated with asphalt has been proposed as a re-cap for certain light duty service applications *(92)*. A new "carpet pile" re-tread has been announced recently *(93)*, but as yet no official decision has been made as to whether or not allocations will be made to produce them in sufficient quantity.

Only a few of the undoubtedly large number of rubber or synthetic products made for the armed forces have been made public. A new life saving suit, employing an interesting all-rubber interlocking zipper, has been described *(94)*. An improvement in the efficiency of the self-sealing fuel tanks now being used on certain types of war planes is reported to have been effected through the use of glass cloth *(95)*. The blanket of glass cloth is said to prevent "flowering" of the metal into the rubbery self-sealing material of the tanks. Three new airplane tires introduced in 1943 *(96, 97, 98)* are reported to resist skidding on icy runways, thus aiding pilots operating under winter conditions. Reports on war materials from foreign countries too, are meager and can only suggest the progress and advances made there. To a new "camel tread" sand tire is ascribed part of the success of the British Eighth Army in defeating Rommel in Africa *(99)*. Results of tests on *Kok-Saghyz* tires, started in 1933, have just begun to be reported *(100)*.

Although the principal stress has been placed on GR-S production as a source of rubber in quantity, investigations of other sources have been continued in 1943. Accurate data on the progress and present state of development are extremely difficult to obtain. However, it is known that extensive plantings of the Cryptostegia vine have been made in Haiti and tapping by a new high-production technique is reported to have begun *(101, 102, 103)*. An ultimate production of 12,000 tons per year (after completion of the proposed program of 100,000 acres under cultivation) is predicted, though 1943 production was only a fraction of this quantity.

Substantial cultivation of *Hevea brasiliensis* has also been started in Haiti, Brazil, Panama, Ecuador and Colombia. A tremendous amount of effort is being expended to develop these sources even though no appreciable amounts of rubber can be expected for a number of years at best. Vigorous efforts to organize collection of wild rubber in the Latin-American regions have also been pursued *(104, 105)*. The total amount thus collected is difficult to estimate, but even though only a fraction of our total needs, is an important contribution in view of the desirability of using some natural rubber blended with GR-S (Buna S) in heavy duty tires.

The guayule situation has not been definitely settled as yet. With the completion of the synthetic rubber program very nearly accomplished, expansion of the guayule program is now being urged *(106)*. Another native plant, the Jojoba nut, is reported to yield a rubber-like material of some interest *(107)*. One of the most recent estimates of the total availability of crude rubber places the amount at 180,000 tons per year *(101)*. Of this amount, 110,000 tons were reported to be coming from Ceylon, 40,000 tons from the Western Hemisphere and 30,000 tons from Africa.

The total Liberian production (estimated at 14,000 tons annually) was said to be going to the United States. Several other interesting articles on the subject of rubber in Tropical America, some of them dealing also with post-war prospects, have been published *(108, 109, 110, 111, 112, 113)*.

Research Largely Unpublished

No report of this nature would be complete without mention of the enormous amount of chemical and physical research which, though largely unpublished, contributed so markedly to the successful solution of our rubber supply problem in 1943. The relatively few papers published on emulsifying agents detergents, etc. *(114, 115, 116)*, new or improved methods of chemical analysis *(117, 118)* and high polymers studies *(119, 120)* can only serve as indications of the direction in which chemical technology is progressing. In the field of physical analysis too, increasing use was made of older tools, such as the X-ray diffraction apparatus *(121)* and the infra-red spectroscope *(122)*.

One of the newest and most widely publicized research tools—the electron microscope—was also extensively employed *(123)* though details are almost completely lacking. New methods for the production of raw materials in large quantities (principally butadiene and styrene) based on the use of both chemurgic (grain alcohol) and petroleum products were found

and are described in the literature *(124, 125, 126, 127, 128)*. An important symposium on a subject vital to synthetic rubber manufacture — reaction rates — in which the theories and practical knowledge of some of the nation's best minds played prominent parts, was held during 1943 *(129)*.

The rayon-cotton tire cord controversy has continued to be a bitterly discussed point *(130)*, but William M. Jeffers' initial stand has been consistently supported, hence rayon is still being employed almost exclusively in heavy duty synthetic tires for the armed services. Progress reports *(131, 132)* issued by the Rubber Director have kept the nation informed during the year on one of the most critical situations of the war. There is little doubt that these reports, based on frankness and a high degree of accuracy, had much to do with the whole-hearted coöperation of the country in the emergency. A somewhat less widely circulated but none the less interesting "report" was the Charles Goodyear Memorial Lecture "The Second Mile" given in 1943 by L. B. Sebrell *(133)*.

Some of the plastics "substitutes" for natural rubber, like some synthetic rubbers, were found to be superior to the original material in some respects and application. Only a very brief mention will be made in this report on such items. The use of plastics for packaging of war goods *(134)* and plastics, natural and synthetic rubbers as protective agents against war gases *(135)* was described in published articles.

Interesting post war possibilities are contained in the reports on synthetic resin emulsions for paper saturation *(136)* and the use of rubber airbags in applying omni-directional pressure in molding of space-curved plastic-plywood *(137)*. It should be emphasized that these are but a small fraction of the large number of such reports which would be more properly included in the report on the Advances in Plastics during 1943 and hence, to avoid possibilities of duplication, are not enumerated in this report.

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STATEX

COMBINES THE QUALITIES DESIRED BY MANUFACTURERS IN CARBON COMPOUNDING OF

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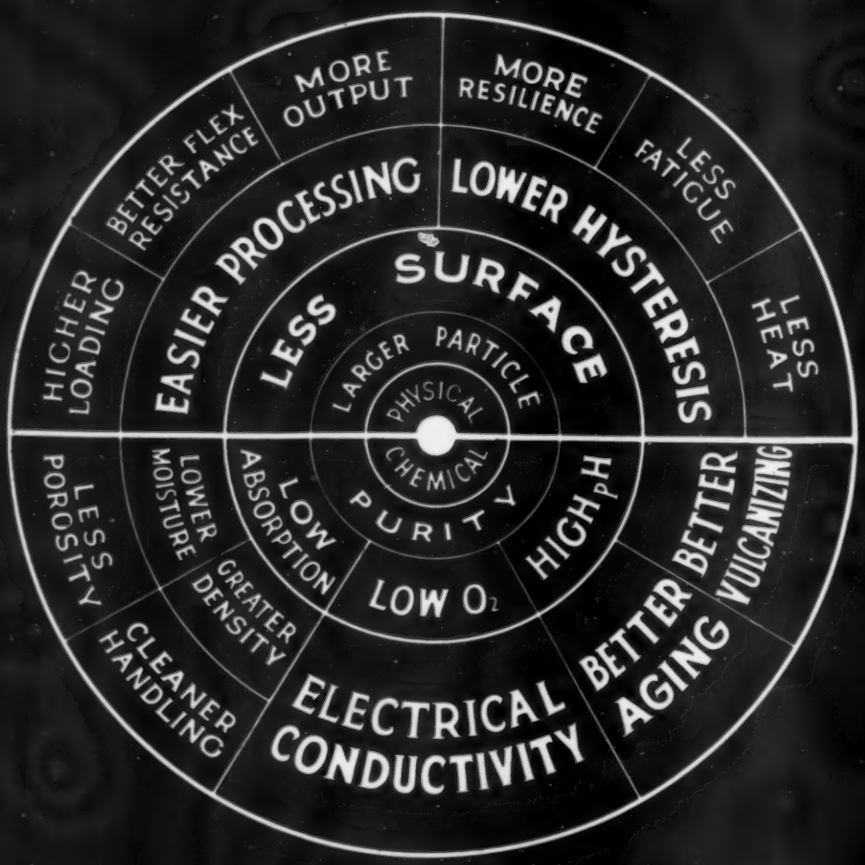

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Pressure-Type Refractometer

ENGAGED in the continuous production of butadiene, the Shell Development Company, Emeryville, California, encountered the problem of instrumentation, capable of indicating the purity of the products as it flowed through a processing pipeline, since continuous production makes it impractical to collect samples for removal to a testing laboratory.

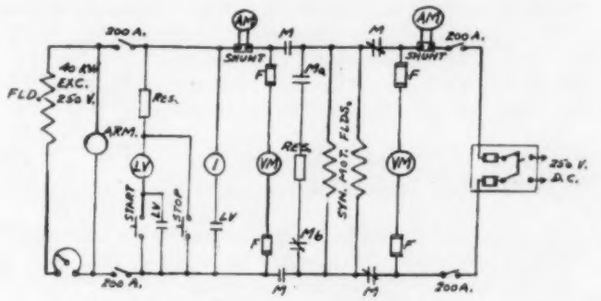
Forced to develop an instrument for the purpose, since no commercial instrument was available, the Shell technical staff found a solution to their problem in the measurement of the physical factor of refractive index as an indication of purity of butadiene. Since butadiene under atmospheric pressure boils at 19° C., refractometric readings must be made either under pressure or at decreased temperature. With this new instrument readings are taken at the pressure at which butadiene is produced.

The liberal policy of the Shell Development Co., coupled with the collaboration of its technical staff, has enabled the Precision Scientific Co., 1750 No. Springfield Ave., Chicago, Ill., to manufacture and market the Shell Continuous Flow Pressure-Type Refractometer. Utilizing the original Shell design, the Precision technical staff has incorporated certain structural modifications and refinements dictated by a knowledge of the widely divergent conditions under which an instrument of this type may be put to convenient use.

The instrument embraces a refractometer, with dipping prism mounted in a pressure cell through which the liquid, whose index of refraction is to be measured, flows continuously under the pressure existing in the process flow-line, while being maintained at constant temperature. Both pressure and temperature maintained within the instrument are adjustable to meet individual installation requirements and applications to various liquids.

Maintaining Excitation for Motors

A LARGE rubber company had the problem of maintaining excitation for various synchronous motors connected to station auxiliary drives. A 40 kw, 250 volt motor-driven exciter supplied the excitation for these synchronous machines; an automatic transfer switch immediately transfers the fields to the emergency power supply, should the normal service fail.



Ma - Mb - TRANSITION INTERLOCKS

During the change-over, the motors continue to operate with no noticeable tendency to get out of step.

This desired operating condition was obtained through introduction of a discharge resistor into the circuit during the transfer period. The resistor is proportioned, as to current and ohmic values, to suit the time constants of the various synchronous motor fields; in this way, the normal field current continues to flow during the period of transfer.

The field contactor transfer-switch is push button operated and is held closed by operating coils which are controlled by a voltage relay on the main excitation system. Low voltage on the exciter system will result in transfer, by spring operation, to the emergency source. The field contactor seals itself closed and sounds a bell alarm when it transfers to the emergency power supply. (Data from Westinghouse Electric & Manufacturing Co.)

NUMBER **NINE** OF A SERIES OF ARTICLES ON

Better Management for the Rubber Factory

IX—INFLATION

By ARTHUR ROBERTS

WHEN the rubber products manufacturer thinks about inflation, it is in terms of our currency, but there is another form of inflation that he seldom considers; yet it is a hazard to his welfare too. We refer to inflation of the balance sheet or financial statement. Recent field studies show that the balance sheets of rubber products manufacturers carry too much water and this is largely because the statements are seldom analyzed. Even those who analyze their profit and loss statements consistently are wont to let balance sheet analysis slide; yet both of these records should be studied critically from month to month.

Paper Net Worth No Criterion

In checking over the balance sheets of a number of rubber products manufacturers during the past 6 months, we found that the net worth showed as much as 40 per cent inflation, an unwholesome condition that may imperil survival and give trouble in the postwar period when the big demand for rubber goods may require expansion and modernization of present facilities and only those in a sound financial position will be able to swing the investment.

A healthy looking net worth on paper may belie the figures. It may be bloated by inaccuracies in supporting accounts and the business may need doctoring. Before the war, the balance sheet could be checked semi-annually with safety because business kept to a more even keel then, but today, changes are coming so rapidly that a monthly check is essential. Let us look into the main phases of balance sheet analysis as it concerns the rubber product manufacturer today.

Current assets: Cash, receivables and inventory. Before the war, if cash was 25 per cent of current liabilities, this was considered a safe ratio. Today, your cash should run at least 35 per cent of current liabilities. Because money is more plentiful, there is a tendency to be satisfied with a lower cash balance, strange as it seems. Sometimes the management draws more remuneration, is more lax with credits and collections or too pre-occupied with governmental regulations and their vague vagaries to pay attention to the little loss-leaks that mount up in time. This is poor business practice today. Keep the cash account above prewar level and the receivables to 50 per cent of prewar level, if possible. If receivables ran 40 per cent of sales in prewar days, they should not show more than 20 per cent of sales on the balance sheet today.

Before the war, inventory was considered in good ratio if it ran 30 per cent of current assets. Today, the higher the percentage the better, because of materials shortages. The rubber products manufacturer need not fear being over-inventoried at this time, although there is considerable speculation as to the advisability of a heavy inventory when the war ends due to the possibility of a drop in market prices. Just now, however, stock is as liquid as cash. In connection with balance sheet analysis, you should devise some method of inventory or stock control and watch this record monthly. Stock control, in itself, is an anti-inflationary measure because it enables a business to get greater sales volume per dollar invested in fixed assets. The greater the sales volume to fixed asset value, the less danger of water in the net worth.

The old-fashioned method of haphazard stock-keeping without an iota of control cannot be tolerated today, even in smaller plants. Record incoming and outgoing materials and verify balances on the stock control records with a physical inventory, at least quarterly. Some managements stagger the count and take physical inventory monthly—a part of the stock this month, another part the next, and so on.

Fixed Assets, Goodwill, Etc.

Fixed assets: Building, machinery, trucks, fixtures etc., should be scaled down to conservative values. Net worth was inflated on more than half the balance sheets studied because the fixed assets were not written down to realistic values by means of depreciation. After the war, new types of machines or more modern units will be marketed so that your present equipment will be obsolete before it becomes old mechanically. Few rubber products manufacturers consider obsolescence on their balance sheets. We suggest that you include at least a 10 per cent contingency reserve for forced obsolescence that is almost certain to affect your fixed assets

in the postwar period and if you haven't depreciated these assets adequately, write them down to present value. In some cases, it may be necessary to increase the depreciation rate if you are unable to maintain your fixed assets in first-class shape due to inability to make adequate repairs or if your equipment is being used more than in prewar days.

Goodwill: Write it down to $1. In one case reviewed, the goodwill was valued at $20,000. Obviously, this is water in the net worth.

Current liabilities: Accounts payable, loans payable, accrued items, such as payroll and taxes due but not yet paid. We find that the biggest weakness here is in failing to enter accrued items, which inflates the net worth for the period. Accrued items should be prorated and charged to profits monthly. This reduces the credit to net worth, prevents inflation. Be particularly careful about accruing taxes. Many enter their taxes only when paid. Taxes should be pro-rated monthly so that they appear on the balance sheet as an accrued liability instead of deflating the net worth. Check the ratio of current assets to current liabilities, otherwise called the current ratio. If 3 to 1, your working capital is in the safety zone.

Fixed liabilities: We find that mortgages and other long-term obligations are not being reduced as much as desirable. Rubber products manufacturers should try to reduce their fixed liabilities in order to reach the postwar period in as liquid a condition as possible.

Contingent liabilities: Some rubber products manufacturers had discounted notes given them by customers in payment of accounts but they had written no contingent liability on the balance sheet. If a customer doesn't pay a note that has been discounted at the bank by a manufacturer of rubber products, the bank will look to him for settlement; hence, a liability should be set up for this contingency and to keep water out of the net worth.

Reserves: Only 60 per cent of the financial statements studied carried adequate reserves for depreciation of building, machinery, trucks, bad debts, etc., which inflated the net worth. Rubber products manufacturers should check on this immediately and write reserves into their books based upon present value of their assets. In one case, we found a $5,000 damage suit pending against the business. The management should have set up a reserve to cover possible loss of suit. Some concerns are also showing a war reserve on the balance sheet to cover postwar losses through forced obsolescence, inventory deflation, damage done by armed forces and repairs deferred because of lack of maintenance facilities in these war days. Usually, this reserve runs ½ of 1 per cent of sales.

Net worth: Includes capital and surplus for a corporation. If an individual or partnership, the net worth is the difference between the assets and the liabilities. We found that after the net worth was deflated with the proper charges that about 30 per cent of the balance sheets showed that liabilities exceeded the net worth, a condition dangerous to survival. The net worth should exceed the fixed assets because the business ownership should provide more than the fixed capital; otherwise, the ownership is contributing no working capital to the enterprise.

If your fixed assets exceed your net worth, you probably are plagued with high fixed charges, a difficult condition to counteract these days; nevertheless, it pays to know where you stand rather than going along "in the blind." If your return on investment or net worth is 6 per cent today, you are doing a good managerial job, but if your net worth is inflated you may fool yourself on this return.

Obtaining the Tensile Properties of GR-S

THE Office of the Rubber Director has released a table of temperature correction factors for use in obtaining the tensile properties of GR-S (Buna S) according to the method prescribed in the specification of the Rubber Reserve Co. for this synthetic, the specification stating that tensile testing shall be done at 82° plus or minus 1° F.

The table, presented herewith, was prepared by the National Bureau of Standards from data obtained by them at five different temperatures, *viz.*, 58°, 70°, 82°, 95°, and 110° F. on the standard Rubber Reserve Co. test recipe. The GR-S and all of the compounding ingredients except Bardol (the softener in use at the time the work was done) were supplied by the Research Compounding Branch of the Rubber Director's Office.

TEST RECIPE

GR-S (ORD No. 45)	100.
EPC Black	50.
Bardol	5.
Zinc Oxide	5.
Sulfur	2.
Mercaptobenzothiazole	1.5
	163.5

Laboratory Press Cures at 292° F.
For Tensile and Elongation — 50 minutes
For Modulus — 25, 50 and 90 minutes

TEMPERATURE CORRECTION FACTORS

(For Tensile Properties of Standard GR-S Recipe)

In order to correct to 82°F. multiply the actual determined values for each of the three tensile properties by the factor corresponding to the temperature at which the tests were made.

Temperature	*Stress at 300%*	*Tensile*	*% Elongation*
60°F.	.96	.82	.91
62	.96	.84	.92
64	.96	.86	.93
66	.97	.87	.94
68	.97	.89	.94
70	.98	.90	.95
72	.98	.92	.96
74	.98	.94	.97
76	.99	.95	.98
78	.99	.97	.98
80	1.00	.98	.99
82	1.00	1.00	1.00
84	1.00	1.02	1.01
86	1.01	1.03	1.02
88	1.01	1.05	1.02
90	1.02	1.06	1.03
92	1.02	1.08	1.04
94	1.02	1.10	1.05
96	1.03	1.11	1.06
98	1.03	1.13	1.06
100	1.04	1.14	1.07
102	1.04	1.16	1.08
104	1.04	1.18	1.09
106	1.05	1.19	1.10
108	1.05	1.21	1.10
110	1.06	1.22	1.11

Editorials

Holiday Greetings

ALTHOUGH Christmas of 1943 finds the world still torn with strife and misery, the peoples of the United Nations have a good deal to be thankful for. The tide of battle has definitely turned in our favor and the writing is already on the wall for our enemies. In wishing our friends a Merry Christmas and a Happy New Year, the staff of RUBBER AGE also adds a fervent prayer that 1944 brings a return to world sanity and a global peace which will banish wars forever.

THE PUBLISHERS

Cost of Rubber

THE cost of getting rubber—of any kind—from Latin American countries under the government program has been estimated in recent months at anywhere from 70 cents to $500 a pound. These estimates, for the most part, came from "experts" whose knowledge was based upon a brief trip through the rubber-producing areas and conversations with a few rubber men in the tropics. These "experts" should not be judged too harshly, since their information came from people who were largely guessing, having no specific knowledge of actual disbursements to date or the exact amount of rubber being shipped into this country.

The wild-eyed estimates, many of which appeared in the daily press following a recent tour by newspapermen of Latin American rubber producing areas, conducted under the auspices of the Rubber Development Corporation, served, however, to bring out the actual facts. Appearing before the Gillette Senate Committee on December 9, Douglas Allen, president of Rubber Development, supplied the first official figures which have been released to date on both disbursements and imports from Latin America.

According to Mr. Allen's figures, actual imports of crude rubber from all Western Hemisphere sources from April, 1942, through December 31, 1943, including the rubber content of tires and tubes acquired, will approximate 45,000 long tons, of which 23,700 tons will come from the Amazon. During this period a total of $83,162,823 will have been expended in the over-all program to get rubber from such sources. This gives a cost of only 82 cents a pound for wild rubber, including the Amazon, and a cost of $1.12 a pound for rubber from the Amazon countries alone. These unit costs include charging to the cost of the rubber received the entire cost of all capital expenditures, investments, loans and loss on sale of tires and tubes.

We are inclined to believe with Mr. Allen that these unit costs will be brought down still further when total expenditures at the expiration of the contracts with various Latin American countries under which the rubber is now being procured, all of which run until 1946, are applied against the gross total of all rubber received. Mr. Allen believes that the eventual cost figure will be below 75 cents per pound. In any event, we must not for a single minute lose sight of the fact that because of our urgent necessity for some crude rubber to be mixed with the synthetics, rubber of any kind from any source is cheap rubber.

Synthetic Conversion

THE issuance of Rubber Order R-1 in revised form emphasizes the rapidity with which the crude rubber stockpile is falling. Still more drastic controls on the use of crude rubber are incorporated in the revised order, while the use of the synthetics has been considerably liberalized. There is no question but that complete conversion of all rubber products to synthetics, other than the few military products which still demand some crude, is simply a matter of months. Conversion to synthetics has been made mandatory on most products by the issuance of official orders. Some conversions remain to be put into effect. We again urge all rubber manufacturers—large and small—who have not yet experimented with the synthetics, hoping to avoid the necessity of its use, and there are several, to secure experimental quantities and run trial batches. Sooner or later they will have no choice.

CURRENT NEWS OF THE MONTH

RUBBER ORDER R-1 IS REVISED TO IMPOSE DRASTIC CONTROLS ON CRUDE CONSUMPTION

THE anticipated revision of Rubber Order R-1 was announced by the Office of the Rubber Director on December 4. Incorporating all directives issued by ORD in the past four months, the amended order sets still more drastic controls upon the consumption of the nation's diminishing crude rubber stockpile and emphasizes the liberalizing of restrictions on the use of synthetics made possible by increasing production of synthetic rubbers. The rapid conversion of the nation's rubber industry from the use of crude rubber to synthetics in the manufacture of rubber products was bought into sharp focus with the issuance of the revised order, which shows that several hundred products for which natural rubber was previously permitted may now be made only from general purpose synthetic rubber, reclaimed or scrap rubber. In most cases, these conversions to synthetics had been ordered by the Rubber Director before issuance of the amended order through directives to individual manufacturers. These have been formally incorporated in the order.

Permitted products are now, to all intents and purposes, placed on an exclusive list, which sets forth detailed regulations for the use of natural rubber or latex. Where previously the list was confined to products for civilian use, it now brings under restriction the consumption of natural rubber or latex in the manufacture of products for military use.

For most of the products listed for which natural rubber is permitted, consumption is limited to a specific percentage of the total volume of the rubber compound used in the particular product. For a large number of listed products no natural rubber is permitted.

No quota restrictions are placed on consumption of so-called "general purpose synthetics" for permitted products. These synthetics include Buna S and neoprene, and may be consumed without limitations as to amount where their use is permitted in individual products. This same provision applies also to the consumption of scrap rubber.

Special Purpose Synthetics

Several types of synthetic rubber, however, have been classified as "special purpose synthetics" and placed under direct allocation by the Office of Rubber Director. These include Neoprene types ILS and FR, Hycar OS-10 and Styraloy. The supply of each of these types is limited and is allocated for specialized industrial and military uses.

One type of synthetic—Thiokol N—has been completely removed from restrictions of the order. Not found adaptable for general use thus far, Thiokol N has been removed from the order to encourage experimentation in manufacturing uses.

The amended order also removes all quota restrictions on the use of reclaimed rubber, effective January 1.

Other important changes are:

1. A production pattern for tires and tubes is established to assure maximum output from existing facilities in line with essentiality of demand. The effect of the provision is to expedite production of the most essential types of tires in their related order of importance before the identical facilities can be used to make less essential types. For example: when interchangeable facilities are involved, the following pattern must be adhered to: (1) airplane tires and tubes, (2) truck-bus tires and tubes, (3) farm tractor-implement tires and tubes, (4) industrial tires and tubes, (5) camelback, (6) passenger and motorcycle tires and tubes, and (7) bicycle tires and tubes. Within each of these broad categories, relative importance of specific tire types is detailed.

2. Through agreements with the Office of Price Administration, purchase of specific sizes and types of solid tires and pneumatic tires and tubes for replacement on industrial equipment can now be made under a revised certification procedure set forth in the order. Purchases made in this manner are not subject to rationing regulations. Only special sizes of tires are covered and they can be sold under the procedure only if for industrial—as against auto and truck—use. Sales of such tires are subject to the specific certification written into the order, which must be placed on every order blank.

3. General appearance of tires may change as the result of a provision banning the use of "extras" in the production of tires. Painting of tires and tubes for the sake of appearance is prohibited. No wrapping of tires is allowed. Removal of minor light spots and other surface imperfections not actually affecting serviceability of tires is not permitted.

4. Restrictions are lifted on the sale of rubber gloves made wholly of general purpose synthetics, or reclaimed or scrap rubber. Such gloves must be properly labeled as to their rubber content, however. Other types of rubber gloves are restricted to medical, government, and other specific uses.

5. Use of crude rubber or natural latex cement in the manufacture of shoes is prohibited after January 1.

6. Preference ratings for the purchase of garden hose on civilian orders are suspended. The action was taken after it was found that equitable distribution could be effected without use of the ratings.

7. An indirect effect of the amended order may be to increase the supply of chilte—an ingredient used in the manufacture of chewing gum. The material, which is imported from South America, is removed from controls of the order since it has been found to be unsuitable for manufacture of essential rubber products.

8. Consumption of 200 pounds of general purpose synthetics for experimental purposes during any 30-day period is permitted.

9. Inventories of reclaimed rubber are now limited to a 60-day supply, compared to a 45-day supply previously.

Shoe Production Permitted

Five days after the issuance of the revised Rubber Order, the ORD announced on December 9, Amendment 1, to become effective January 1. This amendment adds to List 21—Regulations for the Manufacture of Rubber Footwear—canvas rubber-soled shoes. The amendment permits the manufacture of several types of canvas rubber-soled shoes and other special types of rubber footwear formerly prohibited. The new canvas rubber-soled shoes authorized by the ORD will be used to promote the training programs of the armed forces and to meet essential civilian requirements.

Appendix III to the revised Rubber Order, also issued on December 9 by the ORD, is a compilation in printed form of supplementary orders and directives of general applicability which affect rubber and rubber products. In the past these orders and directives have involved principally the conversion of products

from crude rubber to synthetics and have been issued individually to the manufacturers of the particular products. The material in Appendix III is arranged in accordance with the following product classifications: Mechanical Goods; Wire and Cable; Tires and Tubes; Footwear; Heels and Soles; Proofing and Combining of Fabrics; Medical, Surgical, Dental, Drug Sundries; and Miscellaneous. Each of these product classifications has been assigned a section number and supplementary orders and directives in each group are designated by letter.

EXPANSION KEYNOTE OF INDUSTRY AS TIRE SHORTAGE REMAINS SEVERE

In line with the continued expansion of tire plant facilities, the B. F. Goodrich Co. has announced plans for the construction of a new synthetic tire manufacturing plant at Miami, Oklahoma. According to company officials, the site was chosen "after an extensive survey of the Southwest," and after conferences with Oklahoma's Governor Robert E. Kerr and other state officials.

Miami, with a population of 8,000, is located near the Kansas and Missouri borders, 90 miles northeast of Tulsa. The cost and size of the plant were not disclosed by Goodrich, but it was learned at Washington that the unit will have a tire capacity of 4,000 a day at the start of operations and that this will be expanded to 8,000 a day later. Construction work will start shortly.

Goodrich also announced this month that it had leased space at Marion, Ohio, and would move one of its war products departments from Akron to the new location. Most of the personnel released by the transfer of the department will be available for the expanding passenger tire production program, officials said. It is understood that 300 persons, mostly women, will be employed at the Marion plant and that rubber life rafts will be the principal product.

With contracts already awarded and operation scheduled for within five months at the new Gadsden, Ala., $3,000,000 tire plant addition being constructed by the Goodyear Tire & Rubber Co., the Defense Plant Corp. has announced a $470,000 increase in its contract with Goodyear to provide additional facilities at one of the Ohio plants.

Firestone Transfers Department

The Firestone Tire & Rubber Co. announced early in December the transfer of its flotation gear department from Akron to Winston-Salem, N. C., as another step in the general program of transferring war contracts to other cities in order to release labor in Akron for tire and other basic rubber goods production. According to Chairman John W. Thomas of Firestone, about 20 key persons will be moved to Winston-Salem and the other 900 employed in the flotation gear department will be transferred to other departments. Winston-Salem production is scheduled to start between December 15 and January 1 with approximately 1,500 employees.

Chairman Thomas also announced that a special meeting of stockholders had been called for December 15 to authorize $60,000,000 of new preferred stock. According to the announcement, the new stock will carry a dividend rate not to exceed 4½% and a sufficient amount will be issued when market conditions are suitable to redeem the $45,600,000 of 6% preferred stock now outstanding. It was also the intention to ask stockholders to authorize a change in the par value of the common stock from $10 to $25 through capitalization of about $30,000,000 of consolidated surplus now amounting to more than $64,000,000.

Stockholders of the General Tire & Rubber Co., at a special meeting held in Akron on November 19, authorized a new issue of 75,000 shares of $100 par value preferred stock of which 65,000 shares are to be sold. Proceeds will be used for plant expansion and redemption of the old $100 par value 6% preferred stock outstanding. Stockholders also approved redemption of the old stock which had been called by the company for December 31 at $105 per share and accrued dividends. Records listed 21,963 shares of the old stock outstanding with a par value of $2,196,300. General is now constructing a tire and tube plant at Waco, Texas, at a reputed cost of $3,750,000.

Other Expansion Developments

The plan of the Seiberling Rubber Co. to issue debentures to finance expansion of its tire-making facilities was declared operative on December 2 by J. P. Seiberling, president, who said that more than two-thirds of the holders of the prior preference and Class A preferred stock had consented. At the same time, Mr. Seiberling announced that directors had voted to redeem the 317 shares of Class B preferred stock outstanding and remove the issue from the company's capital structure.

The company recently entered into an agreement with the Mutual Life Insurance Co. of New York whereby the latter would purchase $1,500,000 principal amount of 4% 15-year sinking fund debentures, subject to the consent of preferred stockholders.

Mr. Seiberling said that the company would immediately conclude arrangements and proceed with plans for the expansion of tire and tube production facilities at its Barberton, Ohio, plant and that approximately $1,000,000 would be spent for machinery and equipment, and $500,000 for additional manufacturing space required.

Approval of WPB for erection of a plant addition, 100 by 240 feet, has also been announced by the Cooper Corporation, Findlay, Ohio. The plant will be expanded to make tires and tubes.

Responding to the urgent need for more tires, the Fisk tire plant of U. S. Rubber Co. is speeding its building expansion program at Chicopee Falls, Mass. Present plans call for the completion of a new building by late spring. It is being constructed at a cost of $600,000, will cover 200,000 square feet, and will contain five acres of floor space. As various units of the building are completed tire manufacturing machinery will be installed and it is expected that production will be at capacity by next July, provided that sufficient manpower is available. It is estimated that about 500 additional workers will be needed when the building is completed. This is the largest expansion program being undertaken by U. S. Rubber at the present time.

It has been announced that the Eau Claire, Wisc., ordnance plant, which has been manufacturing .30 calibre ammunition, will close December 31. This plant, which was converted by U. S. Rubber from a tire manufacturing factory to an ordnance works in May, 1942, employed at its peak 6,000 persons, a majority of them women. It will be reconverted to the production of tires, as announced in our October issue.

Production Committee Formed

A committee to deal with production and distribution of rubber tires and tubes in the United States, the United Kingdom, and Canada has been announced by the Combined Production and Resources Board. According to the announcement, the committee will be composed of members representing the three countries and will be under the chairmanship of L. D. Tompkins, deputy director of the U. S. Office of the Rubber Director. The committee is already working in close collaboration with a similar group in London and is assembling information in reference to requirements and productive capacity in all member countries.

Following the collection and study of all pertinent data, the committee will recommend to C.P.R.B. such action as it believes advisable in the face of threatened shortage of tires and tubes for military and essential civilian operations. The possibility of expansion of tire and tube production in the United Kingdom was severely limited by the tight manpower situation in Great Britain, and it is apparent that the necessary increased production of tires and tubes will have to be achieved mainly in the United States or Canada, or both.

Other members of the committee are: *for the United States,* C. E. Kohlhepp, director, Program Bureau of WPB; *for the United Kingdom,* Howard Swiggett, deputy director general, British Ministry of Supply Mission, and B. J. O'Donnell, general adviser on rubber and rubber products, British Raw Materials Mission; *for Canada,* one member to be named shortly, and E. R. Medland, Washington representative of the Canadian Rubber Controller.

All presently scheduled production programs covering high tenacity rayon

yarn for rubber tires were completed in November with a WPB directive to the North American Rayon Corp. ordering a 5,000,000-pound expansion to its annual capacity.

This brings the total scheduled output of the high tenacity tire cord type rayon yarn to 240,000,000 pounds. Due to time required for constructing needed facilities, however, actual annual production of the yarn is not expected to reach this level until 1945.

The expanded 5,000,000-pound annual production capacity will be installed at North American's Elizabethtown, Tenn., plant. It is in addition to an 8,200,000-pound capacity previously assigned to the corporation. It is expected that part of the 5,000,000 pound increase will have to be met through expansion of present facilities at the plant, but this must be completed by August 1, 1944.

At the same time, WPB directed the American Viscose Corporation to increase by 11,000,000 pounds its present annual capacity for twisting and weaving of tire cord fabric from high tenacity rayon yarn produced by its plants. This brings its total annual tire fabric production schedule to 39,000,000 pounds. The directive was issued after it was found that the corporation has available floor space for installation of twisting and weaving facilities at both its Parkersburg, W. Va., plant, and the Lewiston, Penna., plant.

Gov. Olin Johnston of South Carolina announced on November 25 that he had been informed by WPB that plans have been approved for the construction of a $2,000,000 rayon cord plant near Clemson College, S. C. It is expected that work on the project will go forward at an early date. Further details were not divulged.

Developments in line with further effort to meet the heavy needs of tire manufacturers for high tenacity rayon yarn included the announced expansion of manufacturing facilities at the plant of E. I. du Pont de Nemours & Co., at Ampthill, Va. Company officials state that the work will be completed in about a year and that production of tire yarn will be increased by 7,000,000 pounds annually. They explain that the expansion involves largely a conversion of ordinary textile equipment.

Information to be Exchanged

Acceleration of the 240,000,000-pound high tenacity rayon yarn program for production of synthetic tires is expected to result from a WPB action revealed late last month which is designed to effect an interchange of technical information among the five producers of the yarn.

The action—in the form of a letter to participants in the high tenacity rayon program—will have the effect of making available "know how" to all participants in the program from manufacturers of longer experience in the technical aspects of producing the yarn, and that little new equipment will be called for.

The letter called for collaboration in the exchange of technical information covering the following points: (1) Physical properties of the high tenacity yarn and methods for testing it. (2) Further improvement and development of the yarn and testing methods. (3) Conversion and expansion of production facilities. (4) Manufacturing techniques.

The letter made the stipulation that information resulting from collaboration will be available uniformly to all five plants and to the armed forces. It also stipulated that operation of the plan will be confined to the exchange of technical information and that there shall be no limitation on the use by any of the five concerns of the information exchanged.

The letter went to the following five producers: American Viscose Corporation, Industrial Rayon Corporation, E. I. du Pont de Nemours & Co., Inc., American Enka Corporation, and North American Rayon Corporation.

Rayon Tire Yarn Committee

WPB has announced the formation of the Rayon High Tenacity Tire-Type Yarn Producers Industry Advisory Committee. The government presiding officer is Harry L. Dalton and the committee members are: J. L. Bitter (North American Rayon Corp.), Frank Griffin (American Viscose Corp.), Hayden Kline (Industrial Rayon Corp.), J. L. Moritz (American Enka Corp.), and H. J. White (E. I. du Pont de Nemours & Co.). The first meeting of the committee was held in November.

LOW COST FOR SYNTHETIC RUBBER SEEN FOR POST-WAR PERIOD

The synthetic rubber industry has already served notice to the world that a price of 16c a pound for crude rubber in the United States will mean plenty of competition from the synthetics, according to a talk by Rubber Director Dewey, made during the presentation of the Chemical and Metallurgical Engineering Award to the American synthetic rubber industry the week of the 19th Exposition of Chemical Industries in New York City. Some GR-S (Buna S) has already been produced at a cost of less than 14c per pound before depreciation, he stated.

In the opinion of the Rubber Director, it is probable that Buna S can be produced for about 12c a pound, before depreciation, in the post-war period, presuming there is no further substantial inflation of prices. This cost, he said, would include about 6c for butadiene, and if butadiene, styrene and copolymer plants are run at capacity, the total cost per pound for depreciation should be approximately 1.05c per pound. Taking this depreciation charge into consideration, he indicated that a minimum price of little more than 13c a pound is likely for Buna S in the future.

The Rubber Director declared that Buna S even now is of a quality that will permit it to replace up to one-half of the crude previously used. "Its quality and the technique incident to using it are being and will be further improved so that its usefulness should (ultimately) closely approach, equal or possibly surpass that of crude rubber," Mr. Dewey said.

"In the light of the above," he continued, "it seems that those who will have to decide as to the post-war handling of the low-cost synthetic rubber plants owned by the government may well seek to find a way by which they can be operated to give a reasonable return to the operator and yet permit him to sell the resultant rubber at a price which will set such a ceiling on crude rubber as to preclude any ill-considered speculative plans which in the long run would result in temporary overproduction, followed by the death of synthetic rubber and more world-wide orgies of limited production and high prices for crude rubber.

"If it seems best to aim at prices in the neighborhood of 15c or 16c per pound, there may well be some formula by which industry and the Government will realize some return in lieu of a full amortization or rental charge for all of its war costs.

"Some still argue that the important point is to realize that the money has been spent for war purposes and that without any charge for depreciation any post-war return should be looked upon as an accidental bonanza, not as the just due of the money already spent. Others will argue that the plants should not be operated unless they bring the Government a full return or at least their replacement cost under post-war conditions. Post-war leaders will inherit these problems."

He stated that, while he did not advocate subsidies or protection for the synthetic rubber industry after the war, he felt, nevertheless, that "we must never again run the risk of being caught without either a good sized synthetic rubber industry or a stockpile large enough to carry us through until standby plants can be brought into production or a pilot-sized industry adequately expanded."

Cosler Sees Improvement Need

Synthetic rubber faces the necessity of establishing its commercial value to a greater extent than it has thus far if it is to compete on an unsubsidized basis in a market in which crude rubber is freely available. This viewpoint was expressed by V. A. Cosler, sales development manager of the DuPont Rubber Chemicals Division, during a panel discussion on new materials and their effect in marketing post-war

products held under the auspices of the Industrial Marketing Section of the American Marketing Association in New York City on December 1.

While stressing the fact that the development of synthetic rubbers has been rapid since the continued supply of natural rubber was threatened, Mr. Cosler questioned whether this development would be sufficiently advanced by the close of the war for the product to make a successful bid in the consuming market.

The various types of rubber have not demonstrated formidable competitive qualities in the tire and tube market, Mr. Cosler explained, pointing out that in the manufacture of heavy duty tires the synthetic product must be strengthened by 10 to 30 per cent natural rubber. Passenger synthetic tires cannot compete with the natural rubber product, he added.

In marketing synthetic rubbers producers will have to find a consuming public where the special properties of such elastomers outweigh the advantages of crude rubber, he said. DuPont expects to market neoprene at between 30 and 35 cents a pound in such a "specialty market," he added.

Collyer Urges Security

Regardless of post-war economic factors, the United States should continue production of synthetic rubber at an annual tonnage rate between 150,000 and 200,000 tons purely as a military security measure, John L. Collyer, president of the B. F. Goodrich Co., stated in an interview in New York City on December 3. Over and above such an "insurance policy," he added, as much additional production of the synthetic product should be allowed "as can be justified through the free play of economic forces to meet post-war needs."

Upon the basis of an analysis made by the company, Mr. Collyer predicted that world rubber consumption for six years following the end of the war will be above 1,500,000 tons a year, and that within a decade following the war such consumption may reach 2,000,000 tons annually. Supply, on the other hand, he said, will approximate 2,787,500 tons, of which 1,757,000 tons will be crude rubber and the balance will be synthetic rubber.

The aggregate annual supply of nearly 2,800,000 tons, which is more than twice as much as the world has ever used before, will exert a strong effect upon price, he continued. While it is impossible to predict the post-war price of the synthetic product the industry feels it will find some method of competing, particularly if broader markets are available.

One basis for estimating post-war rubber consumption, Mr. Collyer explained, might be a study which allows for such factors as prospective growth in motor vehicle mileage, the capacity of the world's rubber industry to produce rubber products, and the historical relationship between the United States and world rubber consumption.

On that basis, he said, it is expected that world rubber absorption will increase from the 1,100,000 figure in 1939 to 1,500,000 in the first post-war year and will constantly increase thereafter.

Estimated Alcohol Needs

While there is a slight reduction from the 330,000,000-gallon estimate of last summer in the alcohol requirements of the synthetic rubber program, according to Rubber Director Bradley Dewey there is no indication that the needs next year will decline to the 250,000,000 gallons reported after a meeting of WPB officials with members of the Distillers Industry Advisory Committee on December 1 at which WPB presented a different set of figures than those used previously. Estimates for the past several months have been running at the rate of 312,000,000 gallons annually, plus or minus, according to the Rubber Director.

Total industrial alcohol requirements for next year were revised downward from 640,000,000 gallons to 625,000,000 gallons, while production, based on maximum use of corn and molasses, was estimated at 620,000,000 gallons. The stockpile, as of December 1, has declined to an estimated 75,000,000 gallons, with the reduction representing accelerated foreign movement which, it was reported, may taper off during the first half of 1944.

More on England's Plant

As reported last month, the British Government has granted a license to British Celanese, Ltd., to undertake the bulk manufacture of synthetic rubber in that country. According to Minister of Production Lyttelton, British Celanese will finance the project itself and labor and materials will be authorized so far as they are available and not required for higher priority. It is understood that existing facilities of the company will be utilized, although the erection of at least one new plant is essential. The quantity to be produced is expected to be only a fraction of requirements. In some circles it is reported that the plant will cost approximately $16,000,000, and will produce about 36,000 tons of synthetic rubber per year.

TECHNICAL CHANGES IN FOOTWEAR MADE; OTHER GOVERNMENT ORDERS

Use of Buna S in the manufacture of waterproof rubber footwear has led OPA to make technical changes in the existing minimum quality specifications for such rubber footwear. Amendment 5 to M.P.R. 132 (Waterproof Rubber Footwear), issued November 25 and effective December 1, makes it possible for manufacturers to use thinner gauges of Buna S compounds. This change was made, it is stated, because present knowledge indicates that the use of such thinner gauges will not reduce serviceability of the footwear.

After specific approval by OPA, manufacturers may also make other changes in these specifications when such changes improve the serviceability of the footwear or avoid a threatened impediment to production. OPA pointed out that these provisions are temporary, pending the collection of more accurate technical information concerning Buna S waterproof rubber footwear. The amendment also provides specifications for several alternate constructions which OPA believes will result in footwear fully as serviceable as that made under the previous specifications.

It is stated that the amendment gives greater flexibility to the specifications previously worked out with the technical assistance of the industry, and that before it was issued OPA consulted with the Waterproof Footwear Industry Advisory Committee. The Administrator also determined, according to OPA, that for securing effective price control there existed no practicable alternative to the continuance of these specifications.

On December 9, OPA issued Amendment No. 6 to the waterproof footwear order, establishing manufacturers' maximum prices for a limited number of types of canvas rubber-soled footwear. Retail ceiling prices will be established by the time the shoes reach the consumer market sometime in the Spring of 1944.

Synthetic rubber (Buna S) and canvas have been made available for the production of some canvas rubber footwear of vulcanized construction under a program of the Office of the Rubber Director-War Production Board, which is intended to make certain styles of canvas rubber-soled shoes available particularly for children, for gymnasium use, and physical fitness programs.

Canvas rubber-soled footwear of vulcanized construction for civilians has not been produced since June, 1942, because the shortage of crude rubber and canvas led the government to limit use of those materials, although the average annual production of such footwear, in a variety of styles, from 1936 to 1941, inclusive, was more than 25,000,000 pairs.

The standardized styles that the ORD now permits to be made are believed by OPA to be comparable, when made according to specifications filed with OPA by their manufacturers, to canvas rubber footwear produced before crude rubber restrictions went into effect. They are priced, therefore, at the level of prices in effect in the fall of 1941 for kinds of canvas rubber footwear that had about the same serviceability.

The prices apply only to sales by manufacturers, and the manufacturer must deduct from them all discounts, allow-

ances and other deductions from the list price he had in effect to a purchaser of the same class on December 3, 1941. If he was not selling canvas footwear on that date, he must use the discounts and other deductions he allowed on the most recent date prior to it; or if he had no discount policy during 1941, he must use that of his most closely competitive seller.

The prices apply to canvas rubber footwear that does not fall below the manufacturer's minimum specifications filed with the Rubber Price Branch of the OPA before December 31, 1943.

The regulation provides that prices for any canvas rubber footwear not listed must be in line with the prices given and must be determined by the seller after specific authorization from the Rubber Price Branch of OPA.

Colors are restricted by the Office of the Rubber Director and the War Production Board to black soles for all shoes, with white uppers for oxfords and women's gym shoes, black uppers for basketball shoes, and brown and black uppers for lace-to-toe bal shoes.

The need is said to be greatest for ranges of sizes from large boy's through children's in the general purpose shoes, both high cut and oxford; for men's and boys' sizes of the training type of shoe, and for misses' and large girls' in the white gym bal.

The same amendment changes the title of the regulation to Certain Rubber Footwear, instead of Waterproof Rubber Footwear, which was its former title.

Simultaneously with the issuance of Amendment 6 to M.P.R. 132, the OPA issued, on December 9, Amendment 13 to M.P.R. 220 (Certain Rubber Commodities). The effect of the latter amendment is to remove from coverage by M.P.R. 220 the canvas rubber footwear which is placed under M.P.R. 132. It also removes from coverage by M.P.R. 220 coated fabrics, which now are covered by M.P.R. 478.

According to Amendment No. 4 to Ration Order 6A (Men's Rubber Boots and Rubber Work Shoes), issued November 16 and effective November 20, a worker whose dealer is unable to fill his order for rationed rubber footwear before his purchase certificate expires may leave the certificate with the dealer and get the footwear at a later date.

HEELS AND SOLES

How manufacturers may determine their maximum prices for odd sizes of rubber heels and soles they sell to shoe manufacturers for use in making shoes for civilians has been announced by OPA. Specific producers' ceiling prices in the trade for rubber soles and heels of standard sizes were given in Appendix A of M.P.R. 477 (Sales of Rubber Heels and Soles in the Shoe Factory Trade), issued October 13 and effective November 1.

Amendment 1 to M.P.R. 477, issued November 29 and effective December 4, provides that the maximum price of a size of sole or heel for which a specific price is not listed in Appendix A shall be the minimum price listed in Appendix A for the sole or heel nearest in size to the item to be priced, plus or minus the manufacturer's March, 1942, dollar and cents differential between the two items.

In the case of a soling slab, the maximum price for an unlisted size is to be determined by multiplying the slab's area in square feet by the listed ceiling price per square foot for a 24-inch by 24-inch slab of the same thickness. The amendment adds the description, "Standard Carbon-Black Type," to most heels and soles listed in the regulation. According to OPA, the regulation is intended to apply only to this type of rubber, and the change in wording is made to make the intention clear.

ELASTIC THREAD

The pricing method to be used by manufacturers of corsets, brassieres, girdles, and garters made with synthetic rubber that in March, 1942, were made with natural rubber is the same, OPA announces, as that in effect for other rubber commodities covered by M.P.R. 220 whose construction is changed from that of March, 1942, only because of substitutions due to shortages of materials or parts. This is the second pricing method given in the regulation.

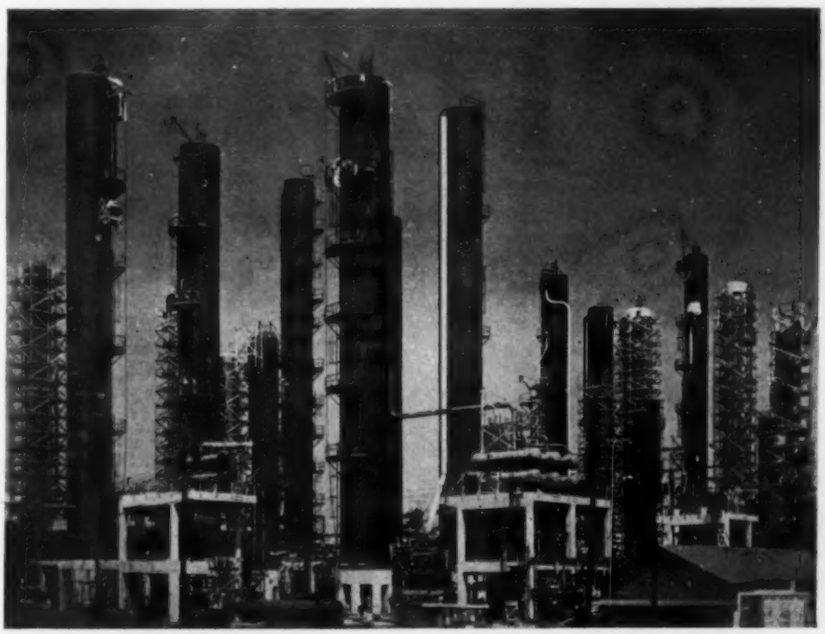
Under this formula, the manufacturer may adjust his highest March, 1942, selling price for the article by the exact amount of the increase in direct cost caused by the change in materials or parts; that is, by the change from natural to synthetic rubber in such parts as the elastic webbing. For example, a roll-on girdle such as the manufacturer delivered or offered for delivery in March, 1942, and which then was made of natural rubber, but which now is made of synthetic rubber, would be priced under the second pricing method.

Also, a garment constructed with side sections of rubber elastic which has been changed so that wider side sections are allowed because of the use of synthetic rubber elastic fabric, would be priced, according to OPA, under the second pricing method.

RUBBER SERVICING

Ceiling prices that may be charged for "servicing" raw rubber have been specified by OPA in Amendment No. 51 to Revised Supplementary Regulation 14 to G.M.P.R., issued November 16 and effective November 22. The prices were issued in cents per pound for each of three types of rubber or rubber substitute.

They have limited application in fact, as most such servicing is done by members of the Rubber Trade Association of New York. They consist of such operations as weighing, sampling, testing, and financing rubber that is bought by rubber manufacturing companies. The action specifies prices for servicing plantation rubber, wild rubber, and guayule at March, 1942, levels. It establishes sepa-



These tall steel towers mark the site of the world's largest center for the production of butadiene from petroleum at Port Neches, Texas. They are part of the plant which is being built and which will be operated for the government by five oil companies under the name of the Neches Butane Products Co. All of the companies involved have declined to accept profit or management fees for their services.

rate maximum prices for servicing synthetic rubbers and for servicing balata.

While the ceilings for these services are in line with the maximum prices for servicing plantation rubber, they reflect differences in cost of performing the service for synthetic rubber and balata, over that for servicing plantation rubber, wild rubber, and guayule. The established price table follows:

Long tons	Plantation, guayule and wild rubbers Cts. per lb.	Synthetic rubbers Cts. per lb.	Balata Cts. per lb.
750 tons and over.....	7/8	7/8	1/2
100 tons up to 750 tons	7/8	1/8	1/2
30 tons up to 100 tons..	1/4	7/8	1/2
10 tons up to 30 tons..	1/2	1/8	1 1/4
1 ton up to 10 tons....	3/4	1/8	2
Less than 1 ton.....	2	1 3/4	4

GOVERNMENT PURCHASES

Through Amendment No. 4 to M.P.R. 403 (Certain Rubber Commodities Purchased for Governmental Use), issued December 3 and effective December 9, OPA restored fairings for propellers to coverage by that regulation. They were included in the original list of commodities covered by M.P.R. 403 but were omitted accidentally when the list was amended. The new amendment also changed the report form in the regulation and added a column to it to provide a space for the manufacturers to enter the base dates on which the rates or prices used in price computations were in effect.

Amendment 5 to the same order, which becomes effective as of December 11, states that canvas-topped rubber footwear, such as climbing shoes, gymnasium shoes and jungle boots, covered by the regulation, includes only rubber footwear of vulcanized construction. According to OPA, the regulation was never intended to cover any other construction, but the fact was not stated explicitly. Canvas-topped rubber footwear of other construction, such as with soles stitched or cemented instead of being bonded by heat treatment as in vulcanizing, is covered by the terms of the General Maximum Price Regulation.

BICYCLE TIRES

Specific ceiling prices for "factory seconds" and for some sizes of new bicycle tires and tubes which have come into production in recent months are incorporated in Amendment No. 2 to M.P.R. 435 (New Bicycle Tires and Tubes), issued by OPA on November 15. The amendment became effective November 20. "Factory seconds" were described as any bicycle tires or tubes with the brand names buffed off or otherwise removed.

MISCELLANEOUS ORDERS

To permit essential production of pyrophyllite, OPA has increased maximum prices for the product by 40 cents per ton, this increase representing the amount necessary to return the total producer cost of making and selling the material. The increase was effected through Amendment No. 20 to Order No. A-1 under M.P.R. 188 (Manufacturers' Maximum Prices for Specified Building Materials and Consumers' Goods Other Than Apparel), effective December 8. Among the many uses of pyrophyllite are its use as a filler for composition battery boxes and, in the rubber industry, as a dusting material.

RUBBER DEVELOPMENT CORP. DEFENDS LATIN AMERICAN EXPENDITURES

A specific reply to the fantastic claims on the cost of getting rubber from Latin America under the emergency war-time program, many of these claims being made by newspapermen who recently toured rubber-producing areas in the Western Hemisphere, was made by Douglas H. Allen, president of the Rubber Development Corporation, in testimony given before the special Gillette Committee of the Senate in Washington on December 9. Mr. Allen estimated that the cost of wild rubber from all Western Hemisphere sources, including the Amazon, through the end of the current year, would amount to only 82c per pound. Estimates from private sources have ranged from $1.00 to $500.00 per pound.

Mr. Allen testified that the actual gross disbursement of the Rubber Reserve Co. and its successor, the Rubber Development Corp., on the wild rubber program in the Western Hemisphere, excluding the Cryptostegia project in Haiti, from its inception in 1941 to October 31, 1943, aggregated $78,208,195. By December 31, 1943, he said, the total of all such disbursements will approximate $83,162,823, out of which approximately $59,710,477 will have been expended in the Amazon countries. A total of $4,832,802 was expended in the Haitian project up to October 31, 1943.

According to the testimony, actual imports of crude rubber from all Western Hemisphere sources from April, 1942, to October 31, 1943, totaled 34,724 long tons of which 15,660 tons came from the Amazon countries, these figures reaching 40,369 tons and 21,095 tons, respectively, if the rubber content of tires and tubes acquired is included. Mr. Allen estimated that imports from all Western Hemisphere sources from April, 1942, to the end of the current year, including the rubber content of tires and tubes, will be approximately 45,000 long tons, including 23,700 tons from the Amazon.

On the basis of these figures, the head of the Rubber Development Corp. stated that the cost of wild rubber from all Western Hemisphere sources, including the Amazon, imported during the period from April, 1942, to December 31, 1943, will come to 82c per pound, and that the cost of the rubber for this period from the Amazon countries alone would be $1.12. He emphasized the point, however, that eventual recoveries on certain capital expenditures, investments and loans will further reduce these costs, pointing out that actually the capital expenditures should properly be prorated over the total amount of rubber received during the period of the rubber agreements which extend to December 31, 1946, in the same sense that the capital investment in synthetic plants is being pro-rated over the rubber produced in a five-year period. Mr. Allen estimated that the average cost of crude rubber that will have been received during the period of the contracts will be less than 75c per pound.

Data on Total Imports

Continuing his testimony, Mr. Allen stated that total imports of crude rubber into the United States from Latin America for the first ten months of 1943 reached 22,380 long tons, against a total for the same period in 1942 of 9,548 tons, an increase of 134%. Total imports for 1943 are expected to aggregate 26,400 tons, compared with 14,486 tons in 1942. Imports of crude rubber from all sources, including those outside of the Western Hemisphere, reached 51,008 tons for the first ten months of this year. It will be recalled that the Rubber Director has estimated total crude imports in 1943 at approximately 60,000 tons.

In later testimony, Mr. Allen revealed that 5,000 sewing machines and 37,000 shotguns were purchased by Rubber Development to use as "trade goods" in getting the rubber out of the Amazon. Many other types of goods were bought in mass quantities for similar purpose, he stated. Senator Gillette expressed dissatisfaction with such purchases, complaining that the government "was not in the merchandising business" and stating that he saw no connection between getting laborers up the Amazon and selling them sewing machines or other merchandise.

Butler Criticizes Costs

Considerable criticism of Latin American expenditures, including that for rubber, was expressed by Senator Hugh A. Butler (Nebraska) in mid-November. He charged that the government has spent about $500 on every pound of rubber brought out of South America and added that despite payment of millions of dollars to buy up nuts in Brazil to get workers released to work in the rubber forests "none was released." Senator Butler's charges have since been condemned by various administration heads familiar with the Latin American programs, including Vice-President Wallace

DECEMBER TIRE QUOTAS EMPHASIZE NEED FOR INCREASED RECAPPING

The continuing shortage of both new passenger tires and new truck tires is reflected in the quotas for the final month of this year. As was true in November, the number of tires available for rationing during December is considerably smaller than in October and earlier months. Because of these reduced quotas, more extensive use must be made of recapping services, OPA pointed out.

The December quota of Grade I tires for passenger cars and motorcycles is 27,685 higher than for November. The quota of new truck and bus tubes is cut 39,455. A separate quota of farm tractor and implement tubes, however, is set up for December. Previously such tubes were charged to the truck and bus tube quota. The December quota of farm tractor and implement tires is 13,800 under the quota for November. Other December quotas show little change.

The month's quota of 581,373 Grade 1 passenger and motorcycle tires compares with 553,688 in November; 829,350 Grade III tires compare with 829,650 in November; and 645,477 new passenger and motorcycle tubes compare with 645,494 in November.

The December quota of 290,519 new truck and bus tires compares with 290,245 in the previous month and the quota of new truck and bus tubes, 258,187, compares with 297,642 in November.

The December figure for farm tractor and implement tires, 32,200, compares with 46,000 in November, with 32,200 tubes also alloted for the current month.

Amendments to Ration Order

OPA has issued three additional amendments to Ration Order 1-A (Tires, Tubes, Recapping, and Camelback) since our last report, as follows:

Amendment No. 60, issued November 30 and effective December 1, provides that persons heretofore eligible for used tires may now buy tires manufactured principally from reclaimed rubber. Others who may also obtain these used and reclaimed tires include military personnel who obtain gasoline (using OPA Form R-544) for official travel in their private automobiles. These provisions are made by reclassifying reclaimed tires from Grade I (new tires) to Grade III (used tires) in order to meet the increased demand for Grade III tires.

Amendment No. 61, issued November 30 and effective December 1, removes from rationing the recapping of tires for commercial vehicles with truck-type camelback. The action was taken at the request of the ORD to encourage a more effective use of recapping service. The amendment also eliminates all branding requirements for passenger tires and permits the recapping of those branded tires that warrant this service. It also permits the sale to a consumer of a tire which, although not suitable for recapping, is usable in its present condition or can be repaired for use.

Amendment No. 62, issued December 9 and effective December 14, establishes the eligibility of Canadian residents driving their automobiles or motorcycles in the United States for occupational or other essential purposes to buy used and reclaimed tires and new tubes in this country. The action reciprocates the treatment in like manner of American motorists driving their cars in Canada.

Additions to Price List

Additions have been made by OPA to its list of maximum retail prices for new rubber motor truck and passenger car tires and tubes. They affect a limited number of new sizes and brands. The level of ceiling prices already established for other sizes and brands is maintained. Specific maximum prices given in the action, Amendment No. 15 to R.P.S. 63 (Retail Prices for New Rubber Tires and Tubes), issued December 9 and effective December 15, include those for several sizes and brands of synthetic rubber tires and tubes that did not appear on the November 25, 1941, price lists of the brand owners and therefore could not be priced under the provisions that already were in the schedule.

Change in Recapping Price

Maximum prices for recapping passenger car tires with Grade A camelback have been issued by OPA because this grade of tire-recapping material is now available for use on passenger car tires when used by taxicabs and "jitneys." Prior to Amendment No. 7 to R.P.S. 66 (Retreaded and Recapped Rubber Tires and the Retreading and Recapping of Rubber Tires), issued November 17 and effective November 23, the OPA price schedule contained maximum prices for recapping passenger car tires with Grades C and F camelback, but not for the use of Grade A.

The maximum prices established by the new amendment for Grade A camelback are in line with the ceilings for the other two grades, but are higher by the amount of the increased direct material cost of Grade A. For example, the price for recapping the 6.00-16 size tire, which is the most numerous, is $7 for Grade A; $6.70 for Grade C; and $6.50 for Grade F camelback when the customer supplies the tire carcass for recapping.

The new amendment establishes also a maximum price for recapping 13.00-24 (12.75-24) 8-ply tire with rock service tread. This is in line with prices for applying the same type of tread to tires of other sizes, on which it is used more frequently.

Other Tire Regulations

Maximum prices for new rubber tires and tubes made wholly or in part of Buna S synthetic rubber and intended for the Federal government will not be made effective before January 15, according to Amendment No. 4 to M.P.R. 415 (Certain Federal Government Purchases of New Rubber Tires and Tubes), issued and effective December 1. At the same time OPA issued Amendment No. 7 to M.P.R. 119 (Original Equipment Tires and Tubes), effecting an extension of time in that order to January 15.

To remove any possible threat to production and distribution during the consideration of a requested increase in the maximum prices of new rubber tires and tubes sold by manufacturers to brand owners, OPA in Order No. 5 under M.P.R. 143 (Wholesale Prices for New Rubber Tires and Tubes), issued November 11 and effective November 12, authorized sales of this sort to be made at prices to be adjusted later in accordance with OPA action.

Restrictions on rubber tires were removed from Limitation Order L 257 (Farm Machinery and Equipment and Attachments and Repair Parts Therefor) in a revision of that order made by WPB on November 15. All provisions on tires may now be controlled by Rubber Order R-1.

Uniform Tire Warranty Issued

The Rubber Manufacturers Association has notified tire dealers that the necessity for manufacturing tires and tubes of various materials and the need for better care of all tires now and in the future, plus the misunderstanding that would result with an additional warranty for synthetic tires only, has necessitated a single uniform warranty applicable to all tires and tubes.

A new Manufacturers' Standard Warranty has been adopted by the tire industry and is as follows:

"Every tire or tube of our manufacture, bearing our name and serial number, whether constructed of natural or reclaimed rubber or of synthetic material, is warranted to be free from defects in workmanship and material and to give service consistent with the material used.

"If our examination shows such tire or tube has failed under the terms of this warranty, we will either repair it or make a reasonable allowance on the purchase of another tire or tube.

"We do not warrant such tire or tube when it has failed as a result of overload, excess speed, improper inflation, abuse or other non-defective conditions or when it has been used on rims not conforming to Tire & Rim Association Standards.

"We make no other warranty of these products, express or implied. No representative has authority to make any representation, promise or agreement except as stated herein."

Kaumagraph Moves N. Y. Office

New York City headquarters for the Kaumagraph Company, whose plant and general offices are located in Wilmington, Del., have been moved to the Empire State Building from 16 E. 34th Street.

BUFFALO GROUP HEARS ZINC OXIDE DISCUSSION

The Buffalo Group, Rubber Division, A. C. S., met at the Hotel Westbrook, Buffalo, N. Y., on Thursday, November 11, for its last formal meeting of the year, the organization's annual Christmas Party having been scheduled for December 16. The speaker at the November meeting was H. Clifford Jones, of the research laboratory of the New Jersey Zinc Co.

Mr. Jones had as his subject "Zinc Oxide in the Compounding of GR-S Rubber" and covered the work carried on over the past year and a half in the laboratories of the Development Engineering Division of his company. His paper dealt largely with GR-S as it is being supplied by the government plants, although modifications of this polymer as well as some experimental polymers also were discussed.

By proper selection of softeners and plasticizers and the proper balance of curatives, it was found, Mr. Jones stated, that quite satisfactory compounds could be prepared which had a high zinc oxide loading. He also presented data showing the effect of surface treatment of zinc oxide in GR-S and indicated that modification of the surface of the pugment also played a part in its reinforcing properties. The speaker invited questions during his talk and so keen was the interest displayed that side discussions were almost continuous.

Burt Wetherbee (Globe Woven Belting), chairman of the Group, appointed the following committee to nominate officers for 1944: Harold Hedden (New Jersey Zinc), A. H. Davis (Dunlop), and P. A. Fortier (General Cable). The election was scheduled for the Christmas meeting.

Ontario Group Hears Wiegand

W. B. Wiegand, director of research of the Columbian Carbon Co., New York City, was the principal speaker at the meeting of the Ontario Rubber Section of the Canadian Chemical Association, held at the University of Toronto in Toronto on November 17. Mr. Wiegand, who spoke on "New Developments in Colloidal Carbons," was assisted by W. A. Ladd. The talk was similar to that presented before the Montreal Rubber & Plastics Group on November 12, a summary of which appears elsewhere in this issue. Approximately 50 members and guests were in attendance.

War Conference Planned

The Thirty-first Annual Convention and War Conference of the National Association of Waste Material Dealers will be held at the Hotel Astor, New York City, on March 14 and 15. It is announced that the program will be formulated with the idea of making it contribute 100% to the war effort.

Coming Events

Jan. 4. Los Angeles Rubber Group, Mayfair Hotel, Los Angeles, Cal.

Jan. 10-14. S.A.E., Annual Meeting, Book-Cadillac Hotel, Detroit, Mich.

Jan. 14. Montreal Rubber Group, McGill University, Montreal.

Feb. 11. Montreal Rubber Group, McGill University, Montreal.

Mar. 10. Montreal Rubber Group, McGill University, Montreal.

Mar. 14-15. N.A.W.M.D., Annual Meeting, Hotel Astor, N.Y.C.

Mar. 28-30. Tenth Annual Chemurgic Conference, St. Louis, Mo.

Apr. 26-28. Rubber Division, A.C.S., Spring Meeting, Hotel Commodore, New York City.

Four Montreal Meetings Planned

According to the program that has been issued by the Rubber and Plastics Division of the Montreal Section of the Society of Chemical Industry, four meetings are scheduled for the balance of the 1943 to 1944 season, the last for 1943 having been a joint meeting with the parent society listed for December 15, at the Ritz Carlton Hotel, Montreal, with Dr. H. Mark, of the Brooklyn Polytechnic Institute, as the speaker.

On January 14, Dr. N. S. Grace, manager of technical service, the Polymer Corporation, and also chief chemist of the Dunlop Rubber Co., will address the division on "The Manufacture of Synthetic Rubbers in Canada." Dr. W. Gallay, of the National Research Council, will speak on "Some New Developments in Plastics" on February 11, and Dr. N. H. Grace, of the National Research Council, scheduled to speak at the March 10 meeting, will have as his subject "Canadian Grown Rubbers and Resins in Relation to the Synthetic Rubber Program."

The aforementioned sessions will be held at McGill University, the place for the final meeting of the season, to be held on April 1, being Queen's Hotel, Montreal. It will be preceded by a dinner. The speaker and subject have not as yet been announced.

Reduce Price of Perbunan

Effective December 1, the price of Perbunan 26 was reduced from 63 cents to 53 cents per pound, f.o.b. Baton Rouge, Louisiana. This product is the regular oil-resistant synthetic rubber sold by Stanco Distributors, Inc., of New York City.

RHODE ISLAND HAS MEETING AND ELECTS 1944 OFFICERS

Approximately 80 members and guests attended the meeting of the Rhode Island Rubber Club, held on November 19 at the Crown Hotel in Providence, R. I. The meeting featured the election of officers for the 1944 season and the presentation of two motion pictures.

Officers elected included the following: *President,* Owen E. Lowe (Davol Rubber); *Secretary,* James W. Scott (Henry L. Scott Co.); *Treasurer,* F. S. Bartlett (U. S. Rubber); Members of the Executive Committee are: L. K. Morrow (Anaconda Wire), H. E. Murch (Goodyear Footwear), S. I. Strickhouser (U. S. Rubber), Daniel Rhee (Carr Mfg.), M. J. Linn (Xylos Rubber), W. Linnell, Sr. (Collyer Insulated Wire), S. J. Lake (Respro), and H. W. Greenup (Firestone). The Nominating Committee consisted of John Marshall (Collyer Insulated Wire) as chairman, and Fred Fitzpatrick (Respro) and Harold Fuller (Pequanoc).

The two films shown were "Robots and Rubber," depicting the mill room of the future, and "Rubber at the Rouge," which traces the former manufacture of tires and tubes at the Ford plant in Dearborn. Both of these were shown through the courtesy of the Farrel-Birmingham Co., whose representative, E. L. Lyon, was on hand.

Local Groups Meeting

As this issue went to press, a number of local rubber groups were holding meetings and Christmas parties in various sections of the country. The Detroit Rubber Group was to hold its Christmas get-together on December 15, the program featuring a talk on "Some Viewpoints on Leadership" by H. G. Mook of the Chrysler Corp. Buffalo's annual Christmas Party was slated for December 16, while both the New York and Chicago groups were to hold their parties on December 17. A meeting of the Montreal Rubber & Plastics Group was scheduled for December 15, featuring a talk on "Some Scientific Aspects of the Synthetic Rubber Problem" by Dr. H. Mark of Brooklyn Polytechnic Institute, while the Ontario Rubber Group was to meet on December 16 with K. B. Mathewson to talk on "Vinyl Resins in the Rubber Industry." Individual reports on all of these meetings will appear in our next issue.

Division to Meet in New York

The Executive Committee of the Rubber Division, A.C.S., has announced that the Spring Meeting of the Division will be held at the Hotel Commodore in New York City, on Wednesday, Thursday and Friday, April 26, 27 and 28. The meeting will again be held apart from the semi-annual meeting of the parent society which will probably be held in Cleveland, although at this writing no definite city has been selected.

AVERAGE HOURLY EARNINGS CLIMB IN RUBBER INDUSTRY

Average hourly earnings in the rubber industry increased 35% in the period from September, 1939, to June, 1943, according to the U. S. Department of Labor. This increase is identical with that reported for the paper and products industry and is the third lowest among the totals for all manufacturing industries reported by the department, exceeding only that of the apparel industry, 33%, and the petroleum and coal products industry, 28%.

The increase in average hourly earnings in the chemical and allied industry classification in the same period amounted to 43% while textile products and leather and products showed increases of 45% and 44%, respectively. For comparison, other manufacturing industries covered by the Department of Labor report showed the following increases: Transportation equipment and lumber and timber, 51%; non-ferrous metals, 47%; machinery (excluding electrical), 43%; food and products, 40%; iron and steel and electrical machinery, 39%; and tobacco products, 36%.

Comparison of statistics of the Department of Labor by the Department of Manufacture of the Chamber of Commerce of the United States reveal that increases in weekly earnings have been far greater than increases in the index of the cost of living and that hourly earnings have increased more rapidly than living costs, even though increases in straight-time wage rates have been restrained by the "Little Steel" formula.

According to the Chamber of Commerce comparisons, from September, 1942 (the base at which prices and wages were to be stabilized under the Price Control Act of October 2, 1942) to September, 1943, the cost of living index increased 5% while weekly earnings in all manufacturing increased 17% and hourly earnings increased 11%. From January, 1941 (the base month of the War Labor Board's "Little Steel" hourly-wage formula), to September, 1943, the cost of living index increased 23%, weekly earnings in all manufacturing increased 66%, and hourly earnings increased 45%. From August, 1939 (the last month before the outbreak of the European war), to September, 1943, the cost of living index increased 26%, weekly earnings in all manufacturing increased 87%, and hourly earnings increased 59%.

In the rubber products industry the Chamber of Commerce points out that average weekly earnings of $47.35 in September, 1943, were 20% higher than in the same month of 1942, 56% up from the level of January, 1941, and 68% more than in August, 1939. Average hourly earnings of 105.7 cents were 12% higher than in the same month of 1942, 36% up from the level of January, 1941, and 39% more than in August, 1939. Average hours per week amounted to 44.8 in September, 1943, being 8% higher than in September, 1942, up 15% from January, 1941, and 21% more than in August, 1939.

Kleinert Holds Preview

"New Horizons," a preview of waterproofed, washable wearables as they will appear in the future when they will be made from various synthetic rubbers and plastics, all to be marketed as "Kleinetics," was held in the showroom of the I. B. Kleinert Rubber Co., 485 Fifth Avenue, New York City, early this month. Included among items on exhibit were dress shields, braforms, baby pants, crib sheets, sanitary belts, bathing caps, shower curtains and girdles.

New Rubber-Like Material

Texrub, a new synthetic rubber-like material, believed to have a vinyl base, has been announced by M. B. Price & Associates, 350 Fifth Avenue, New York City. It is said to be gas resistant, water repellent, resistant to acids and alkalies, and self-sealing under heat and pressure. According to Price executives, the new material can be fabricated to all standard rubber tolerances on standard rubber equipment.

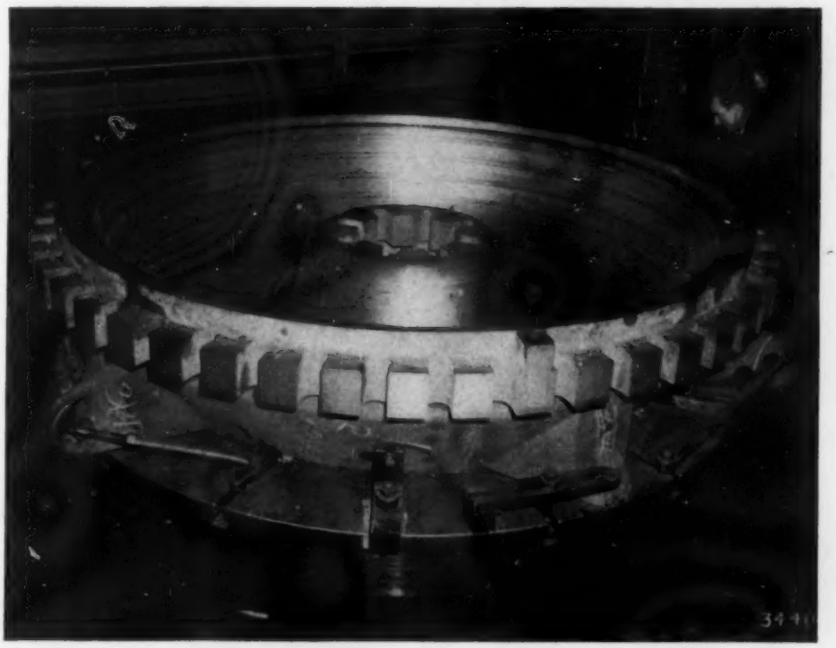
SAE to Discuss New Materials

Potential industrial uses of new materials, such as plastics and synthetic rubbers, and broader applications and new adaptations of established materials, such as steel, will be among featured subjects at the 1944 War Engineering-Annual Meeting of the Society of Automotive Engineers in the Book-Cadillac Hotel, Detroit, Mich., January 10 to 14. The preliminary program, according to S.A.E. Secretary and General Manager John A. C. Warner, provides for one entire session to be devoted to discussion of wartime developments in steels and their possible future uses, and to the wartime and post-war utilization of aluminum, magnesium, synthetic rubbers, and plastics.

Clarke Heads Lake Shore Tire

M. H. Clarke, formerly vice-president of the Lake Shore Tire & Rubber Co., Des Moines, Iowa, was recently elected president of that company. Other new officers include L. C. Frazier, vice-president in charge of production, and A. A. Shifty, secretary-comptroller. L. M. Baker was made chief chemist and Alan Wood Schoeller, general purchasing agent. T. R. Benton is personnel director.

GIANT 30-TON AIRPLANE TIRE MOLD IS MADE OF MEEHANITE METAL



One of the largest tire molds ever made has recently been completed by the Farrel-Birmingham Co., Inc., Ansonia, Conn. The mold, pictured above, weighs a total of 30 tons and is already in use by one of the leading tire manufacturers in the production of 110-inch diameter airplane tires, each of which alone weighs 1,800 pounds. The mold was made of Process GM Meehanite in order to give it high strength, close-grained structure and free machinability. Made by the Randupson cement process of molding, each of the two 15-ton castings making up the mold were poured and all machine work done at the Ansonia plant. After cleaning, the castings were heat treated.

TALK ON COLLOIDAL CARBONS HEARD BY MONTREAL GROUP

A discussion of "New Developments in Colloidal Carbons," by W. B. Wiegand, director of research of the Columbian Carbon Co., New York City, featured the meeting of the Rubber & Plastics Division, Montreal Section, Society of Chemical Industry, held at McGill University in Montreal on November 12. The meeting was preceded by a dinner at the Berkeley Hotel, with approximately 40 present at the dinner and about 70 at the meeting itself.

Mr. Wiegand began his talk by giving some of the history of colloidal carbon, which dates back to the Ancient World, discussing Chinese discoveries, evolution of impingement, and the situation as it existed in 1910. He then discussed five modern developments, including reinforcement, furnace black, pH and carbon surface chemistry, the electron microscope, and carbon network structure and its implications.

In discussing pH and carbon surface chemistry, the speaker outlined the cause of pH, hydrolytic adsorption, preferential adsorption and chemisorption, while on the subject of the electron microscope he made the point that recent studies with this new research instrument have established the particle size of various synthetic latices. He added that by means of the electron microscope it has been learned that some of the newer furnace carbons have a network structure. Mr. Wiegand ended his interesting talk by a discussion of the carbon spectrum of today.

W. A. Ladd, associated with the research department of Columbian Carbon, assisted Mr. Wiegand, and demonstrated how specimens are prepared for the electron microscope.

Additional "E" Awards

Included among companies receiving the Army-Navy "E" award for production efficiency in recent weeks were the following:

American Anode, Inc., Akron, Ohio.

Diamond Wire & Cable Co., Chicago Heights, Ill.

Hewitt Rubber Corp., Buffalo, N. Y.

Imperial Paper & Color Corp., Pigment Color Div., Glens Falls, N. Y.

Manhattan Rubber Manufacturing Div. of Raybestos-Manhattan, Inc., Passaic, N. J.

Plant Rubber & Asbestos Works, San Francisco, Calif.

Alexander Smith & Sons Carpet Co., Yonkers, N. Y.

U. S. Rubber Co., Footwear Div., Naugatuck, Conn.

Wilson Athletic Goods Manufacturing Co., Inc., Chicago, Ill.

White star awards for continued maintenance of high output standards have been received by Firestone Rubber & Latex Products Co., Fall River, Mass.; Firestone Tire & Rubber Co., Akron, Ohio; and B. F. Goodrich Co., Los Angeles, Calif.

FINANCIAL NEWS

Raybestos-Manhattan, Inc.

First Nine Months: Net profit, $1,279,239 after a reserve of $575,000 for post-war adjustments, renegotiation, and other contingencies and $5,005,000 for Federal taxes after allowing for a post-war refund of $483,000. The profit is equivalent to $2.09 a share and compares with $1,268,924, or $2.02 a share, in the first nine months of 1942, when $5,127,000 was provided for taxes.

Thiokol Corporation

First Nine Months: Net income, subject to possible reduction in sales prices on war contracts as a result of renegotiation, $32,220, after provision of $21,482 for Federal income and excess profits taxes. This compares with a net income of $60,279 after provision of $195,600 for Federal taxes in the corresponding period of last year.

Columbian Carbon Co.

Nine Months: Net profit of $2,022,219, equivalent to $3.76 a share on 537,406 shares of capital stock, which compares with $2,140,999, or $3.98 a share, reported for the corresponding period of last year.

United Carbon Co.

Nine Months: Net profit of $1,340,590, or $3.37 a share, after $1,027,000 taxes, which compares with $1,285,842, or $3.23 a share, after $1,186,000 taxes, reported for the corresponding period of 1942.

Master Tire & Rubber Corp.

First Nine Months: Net income, $241,048, which compares with $78,647 in the corresponding period of 1942.

L. A. ELECTS OFFICERS; HOLDS ANNUAL XMAS PARTY

The election of officers for the Los Angeles Group, Rubber Division, A.C.S., conducted by mailed ballot, has resulted in the following selection for the 1944 season: *Chairman,* A. L. Pickard (Braun Corp.); *Associate Chairman,* R. E. Hutchinson (Firestone); *Vice-Chairman,* C. M. Reinke (Reinke, Hiller & Amende); *Secretary,* W. E. Boswell (Thiokol); *Treasurer,* C. R. Wolter (U. S. Rubber). The board of directors includes P. W. Drew (Goodyear), Edward L. Royal (H. M. Royal, Inc.), and W. F. Vonder Reith (Sierra Rubber). The new officers take over in January.

Some 500 members and guests of the group attended the annual Christmas theatre party held this year in lieu of the regular December supper meeting. The group took over the entire seating capacity of the Pasadena Community Playhouse on December 7 and enjoyed the presentation of "Dark Eyes," substituted for the play "Claudia" at the request of the committee in charge of arrangements. Refreshments were served between acts. The occasion was generally voted a most enjoyable evening.

The next meeting of the group is scheduled for Tuesday evening, January 4.

Submit Slate for N. Y. Group

The Nominating Committee of the New York Group, Rubber Division, A.C.S., headed by J. deC. Van Etten (Vansul) as chairman, assisted by Kenneth B. Carey (Vanderbilt) and Simon Collier (Johns-Manville), will submit the following slate of officers for 1944 before the meeting of the group to be held on Friday, December 17, in New York City: *Chairman,* F. S. Conover (Naugatuck Chemical); *Vice-Chairman,* H. E. Outcault (St. Joseph Lead); *Sergeant-at-Arms,* Ervin S. Kern (Vanderbilt); *Secretary-Treasurer,* Peter P. Pinto (RUBBER AGE); *Executive Committee* (for three-year terms), Harry L. Fisher (U. S. Industrial Chemicals), S. M. Martin, Jr. (Thiokol), and Harry Frecker (U. S. Rubber). Selection by the Nominating Committee is tantamount to election.

New A.S.T.M. Standing Committee

In accordance with authorization extended by the executive committee, Committee D-16 on Industrial Aromatic Hydrocarbons has been formed by the American Society for Testing Materials. The new standing committee will cover such products as various grades of benzene, toluene, xylene, solvent naphthas, and other light oil products. J. M. Weiss, consulting chemical engineer of New York City, is temporary chairman of the committee. Permanent officers will be selected next June. J. F. Anderson, of the B. F. Goodrich Co., will represent Committee D-11 on Rubber Products on the new committee.

NAMES IN THE NEWS

T. L. GRESHAM, associated with the B. F. Goodrich Co. for the past several years, has been appointed director of the Koroseal and Plastics Laboratory in the company's research division.

L. B. NICHOLS, associated with the Wire Division of the General Electric Co. at Bridgeport, Conn., for the past few years, has left that company to join the American Brass Co. at Waterbury, Conn.

P. W. BARKER, long associated with Government rubber activities, most recently affiliated with the Rubber Development Corp., has joined the Division of Review and Special Studies of the Office of Defense Transportation, Washington, D. C., serving under CHARLES L. DEARING. At present, he is concerned with tire statistics.

A. O. BLADES, rubber technologist for the Rome Cable Corp., Rome, N. Y., and previously associated with the General Cable Corp., is now associated with the Plastic Wire Corp., Norwich, Conn., in the capacity of factory manager.

JOHN BALL, technical representative of the R. T. Vanderbilt Co. and editor of *Vanderbilt News* (temporarily suspended), who has been on leave while serving in the Office of the Rubber Director, has resigned his government position and is again contacting the trade for the company.

LEE WHITE, until recently assistant superintendent of the Rome, N. Y., plant of the General Cable Corporation, is now associated with the Gavitt Manufacturing Co., Brookfield, Mass., where he is in charge of manufacturing operations.

HOWARD F. JOHNSON, associated with the U. S. Rubber Co. since 1922, has been appointed manager of branch sales of the wire and cable department. Prior to this promotion, he was western district sales manager.

GASTON F. DUBOIS, vice-president of the Monsanto Chemical Co., St. Louis, Mo., has been selected to receive the Perkin Medal of the Society of Chemical Industry. It is being awarded in recognition of his outstanding work in applied chemistry.

DR. IRVING HOCHSTADTER, formerly head of the Hochstadter Laboratories, Inc., and of Still & Van Siclen, Inc., has been appointed research administrator of Gallowhur & Co., New York City, developers of a new process for mildew-proofing of rubber and other products.

DR. LESTER S. SINNESS, engaged in research activities in the technical division of the Rayon Department of E. I. du Pont de Nemours & Co., Inc., for the past 8 years, has been named director of viscose rayon research for that company. DR. EDWARD F. WESP has been named assistant director.

H. A. DAVIS, associated with the Thermoid Co., Trenton, N. J., for the past ten years, has been named sales manager of the Atlas Asbestos Co., North Wales, Penna.

FRANK CLARK, associated with the Royal Electric Co. for the past few months, has left that organization and has joined the Anaconda Wire & Cable Co. Previous to joining Royal Electric, he was affiliated with the Lowell Insulated Wire Co. and before that with John A. Roebling's Sons Co.

JOSEPH F. SLOATE, until recently chief of plant administration at the synthetic rubber plant operated by General Tire & Rubber Co. for the government at Baytown, Texas, has been appointed manager of personnel of that company, with headquarters at Akron.

MORTON STARR CRESSY, JR., who has been identified as head of the aniline, rubber accelerator and beta naphthol plants of the Calco Chemical Division of the American Cyanamid Co. at Bound Brook, N. J., has been appointed sales representative in the company's Chemicals and Intermediates Department.

JAMES W. MAPLES, who recently returned to Akron after 10 years in England as general factory manager of the company's plant at Brentford, has been named production manager of all tire divisions of the Firestone Tire & Rubber Co.

C. R. CLARK, factory superintendent, and LAVERN PAGEL, chief chemist, have both been added to the board of directors of Pioneer Rubber Co., Willard, Ohio.

CHARLES H. KANAVEL, associated with the B. F. Goodrich Co. since 1933, has been appointed manager of the Track and War Products Department of the National Sales and Service Division. He succeeds E. F. TOMLINSON, recently named general manager of the Industrial Products Sales Division.

AUGUST W. KOPS, formerly export manager of rayons for the U. S. Rubber Export Co., has joined the Blossom Products Corp., New York City, as vice-president and chairman of the executive committee.

Beadle with Naugatuck Chemical

H. I. Beadle

As announced in our previous issue, Harold I. Beadle, widely known chemical engineer, has been appointed sales manager for new products of the Naugatuck Chemical Division of U. S. Rubber Co. In this capacity he will handle sales of new synthetic rubbers and synthetic plastics for the company as well as new developments in other chemical fields now being explored. Mr. Beadle was graduated from M.I.T. in 1923 with a Ch.E. degree, and practiced in New York City as a consulting engineer for six years, during which time he did considerable research and development in cellulose derivatives and compounds. At one time he was associated with the Tide Water Associated Oil Co. and Commercial Investment Trust, Inc.

H. M. TAYLOR, until recently manager of the Detroit area for the Firestone Tire & Rubber Co., has been named manager of the company's manufacturers' sales division, with headquarters in Akron. He is succeeded at Detroit by D. J. HUTCHINS.

A. G. RICHTMYER, until recently head of the research division of the tire rationing board of OPA, has been appointed manager of the sales analysis department of the Fisk Tire Division of U. S. Rubber Co. He was formerly connected with the company.

W. D. ANDERSON, who has been acting as chairman of the board of the Bibb Manufacturing Co., Macon, Ga., for the past several months, has resumed the presidency of that company as well. CHARLES C. HERTWIG has been elected vice-president and treasurer.

NEW CHEMICALS AND EQUIPMENT FEATURE CHEMICAL EXPOSITION

Numerous new industrial chemicals and machinery and equipment intended for use by the chemical process industries featured the 19th Exposition of Chemical Industries, held in Madison Square Garden in New York City from December 6 to 11, inclusive. Many post-war advances in industrial chemistry were forecast by the exhibits, most of which strongly featured present war work.

Of special interest was the exhibit of the American Chemical Society which featured recent achievements, including cracking operations of two different types, one of which employs a new synthetic bead catalyst and the other the so-called "fluid" catalyst, an explanation of the "heatronic" molding of plastics, and a display of the curious mold *pencillium notatum,* from which the new curative agent Penicillin is derived.

Also of general interest was the exhibit of the Chemical Warfare Service, which displayed gas masks, and suits of impregnated clothing and impermeable clothing for use in gas contaminated areas. Another feature was the Alien Property Custodian's library of 45,000 seized enemy patents and applications, now available to American industry on a licensing basis.

Machinery Exhibits Numerous

Among the machinery exhibits on view were colloidal mills and mixing equipment shown by the Abbe Engineering Co., Baker Perkins Co., Eppenbach, Inc., Chemicolloid Laboratories, and the Premier Mill Corp. The latter exhibited a new No. 200 colloid mill with a 2-inch rotor, suitable for every type of laboratory work involving emulsions, dispersions, wet mixing, etc. A new type of intensive mixer, suitable for cold-mix inorganic plastics among other uses, was shown by the National Engineering Co., of Chicago. Its full line of Eastern industrial mixers was displayed in the booth occupied by the Eastern Engineering Co., while the Mixing Equipment Co. showed its line of Lightning mixers, both portable and large scale, in its booth.

Laboratory instruments were liberally displayed, including the Plastograph, by the Brabender Corp.; Alnor pyrometers for surface testing by Illinois Testing Laboratories, Inc.; and miscellaneous recording instruments by both Cambridge Instrument Co. and the Leeds & Northrup Co. Illinois Testing, incidentally, displayed a new type of dew point indicator, which was reported to be finding specific application in the rubber industry.

Additional machinery items of particular interest to the rubber industry were also on exhibit including the following: rotary sifters by the B. F. Gump Co.; a new Electrograph (electronic tare compensator) by the Exact Weight Scale Co.; continuous filtration equipment, which has found ready application in the manufacture of synthetic rubber, by Oliver United Filters, Inc.; special pumps suitable for handling natural and synthetic latex by the Tri-Clover Machine Co. and T. W. Shriver Co.; water conditioning apparatus by the Graver Tank & Mfg. Co.; high-speed presses by the F. J. Stokes Machine Co.; Chromalox heating units by the Edwin L. Weigand Co.; and special drying machinery by Proctor & Schwartz, Inc.

The exhibits of industrial chemicals, including several with specific application in the compounding of natural and synthetic rubber, were numerous and well handled. Many of them featured murals and blown-up photographs because of the nature of the materials. In all cases, however, technical representatives were on hand to answer all questions on compounding and processing.

For instance, the story of Reanite, the new bonding agent for uniting metal to metal or rubber, synthetic rubber, plastics, etc., to metal or to each other, was told pictorially in the booth of the U. S. Stoneware Co. The various Tygon resins featured by the company were also on display at this booth. The importance of Alorco Hydrated Aluminas to military rubber products was stressed in the Aluminum Ore Co. booth, especially in the production of gas masks. The important role being played by chemical intermediates in the war effort was emphasized by attractive photographs and samples at the booth occupied by the Koppers Company.

The numerous chemicals and compounding ingredients offered by the Hercules Powder Co. for the manufacture of rubber products, as well as reclaimed rubber, were displayed, including Staybelite Resin, which functions as a softener, tackifier and plasticizer. The Neville Co. showed samples of its equally numerous coal-tar solvents and resins, both of which are widely used in rubber compounding. The plasticizers, defoaming agents, synthetic waxes and synthetic resins featured by the Glyco Products Co. were to be seen in the booth of that company. Other chemicals of interest on display included Celite mineral fillers in the Johns-Manville Corp. booth and Dicalite fillers, made from pure diatomaceous silica, in the Dicalite Co. booth.

A handfull of rubber manufacturers also occupied booths at the exposition, displaying their specialty products for the chemical process industries. These included the American Hard Rubber Co., which showed its extensive line of Ace rubber-lined tanks, pumps, pipes and fittings, valves, etc.; Garlock Packing Co., with its line of packings and gaskets; Mine Safety Appliances Co., with its numerous safety appliances, many of which are constructed or partly-constructed of rubber, including respirators; and the Pioneer Rubber Co., which displayed its line of Stanzoil neoprene gloves.

Changes at Hale Rubber

Several changes have occurred in the executive personnel of the Alfred Hale Rubber Co., North Quincy, Mass., following the recent death of David A. Cutler, one of the pioneers of the American rubber industry. David R. Cutler has been elected president and A. Cushing Cutler becomes treasurer. Richard H. Sherman has been named Works Manager.

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RUBBER GROUP OF A.S.M.E. HOLDS TECHNICAL MEETING

Three technical sessions were held on December 1 and 2 by the Rubber & Plastics Group of the American Society of Mechanical Engineers during the annual meeting of the parent society held in New York City early this month. Approximately 150 members and guests attended the first session, held in conjunction with the Aviation Division of the Society on the afternoon of December 1, during which three papers were presented, as reported last month. The plastics session was held on the morning of December 2, three papers being presented at this session as well.

Approximately 100 attended the rubber session of the group, held on the afternoon of December 2. It was particularly interesting to note that consumers of rubber products rather than manufacturers of such products were dominant at this as well as at the other two sessions. Papers on "Inflatable Life-Saving Rafts in the War Effort," by J. G. Kreyer (Firestone), and "Use of Rubber in Power Drive Lines," by James N. Booth (Thompson Products), were presented at this session, as well as reports on the advances of rubber and plastics during 1943 by W. J. Liska (Firestone) and Gordon M. Kline (National Bureau of Standards), respectively.

In his paper, Mr. Liska, who heads coated fabrics development for Firestone at Akron, predicted that rubber boats may be used by fishermen and sportsmen after the war, since they do not take much space, are easy to carry when deflated, and are hardy sea-going craft. He expressed the belief that rubber lifeboats will replace rigid ones when they are available, because they can be lashed to the side of any large vessel and take up much less room. He emphasized the point that the rubber boats can be inflated in a matter of seconds.

Mr. Kline was re-elected chairman of the Rubber & Plastics Group, while Mr. Booth, who presented one of the papers, was named secretary. There is some possibility that the group may be given full divisional status by the A.S.M.E. in the near future.

U. S. Rubber War Exhibit

The numerous rubber products being made by the U. S. Rubber Co. for the successful prosecution of the war, were displayed in a special exhibit at the company's headquarters in New York City during the first two weeks of the current month. This is the same display that was on exhibit in Washington recently where it was reported to have been visited by some 7,000 government officials. The exhibit featured the five commercial synthetic rubbers made up into numerous products including tires, self-sealing gasoline tanks, inflatable boats, life-saving suits, raincoats, jungle boots and convoy balloons.

INFORMATION WANTED

The Office of the Rubber Director is daily besieged with requests for information on this plasticizer, that softener, the other ingredient —all concerned with the compounding of GR-S and the other synthetics. Whenever possible such information is furnished. The information, however, is not always on hand, although the Office has a specially-compiled card file of such materials. It is therefore urged that all manufacturers of plasticizers, softeners, and other compounding ingredients used in connection with synthetic rubber who have not already done so supply Washington with the name and a description of all such materials. This applies particularly to new and relatively-new materials not yet familiar in the trade. The information should be sent to: Dr. H. E. Simmons, Office of the Rubber Director, New Municipal Building, Washington, D. C.

California Group Meets

A special meeting of the Northern California Rubber Group was held on December 2 in the Hotel Claremont, Berkeley, California. There was no formal speaker present and the evening was devoted to an inter-member discussion of synthetic rubber problems, including the moisture content of GR-S, the stability of GR-M, the effects of using RPA No. 5 in GR-S compounding, and the conversion of specific rubber equipment to GR-S production. Nominations were made for 1944 officers and George Petelin (Goodyear Rubber) was named chairman of the Christmas Party committee. Leonard Boller (Pioneer Rubber Mills) won a brief case donated by the Binney & Smith Co. through Martin, Hoyt & Milne, representatives. The group's first annual Christmas Party will be held at Dugan's Theatre Cafe in Emeryville on December 20.

Hutchman Leaves ORD

J. E. Hutchman, who has headed the Specialty Synthetic Rubber Branch of the Office of the Rubber Director at Washington, D. C., since the creation of that branch, has left government service and will now spend full time in his capacity as a technical consultant. During the tenure of the specialty branch, now being disbanded and its work distributed among other branches of the ORD, more than 150 synthetic and rubber-like materials came under its scope, of which about 10 are today in commercial production. Mr. Hutchman can be reached at 347 Glenn Circle, Decatur P. O., Atlanta, Georgia.

CROSSLEY, OF XYLOS RUBBER, ADDRESSES THE CHICAGO GROUP

Robert H. Crossley, of the Xylos Rubber Co., addressed 125 members of the Chicago Group, Rubber Division, A. C. S., at the Morrison Hotel, Chicago, on November 19. Mr. Crossley's subject was "Compounding and Processing of Butaprene." The non-technical speaker of the evening was Ensign Harold B. Boaz, U. S. N., who spoke on some of his experiences in the South Pacific.

Mr. Crossley pointed out that there are four basic types of Butaprene "N" now in production, each representing modifications developed to meet specific requirements of processing, oil resistance or cold resistance.

Butaprene NX, the first member of the series, is highly oil resistant and gives high tensiles but is rather hard to process, according to Mr. Crossley. Butaprene NA, the next type, is less oil resistant and gives less tensile but is easier to process. The third type, Butaprene NM, is the all-purpose Butaprene, being the easiest to process of the three mentioned. The fourth type, Butaprene NF, is a special type made particularly for cold resistance and is not as good for tensile as the others.

Slides of graphs were shown depicting the different properties of the Butaprenes with varying quantities of Altax, sulfur, filler, and plasticizer and the results that can be obtained by blending the various types also were described. Wartime applications and post-war possibilities of the materials were discussed and samples of finished products, manufactured by Firestone, were shown.

The next meeting of the Chicago Group will be held at the Morrison Hotel on February 4, with the annual Christmas Party scheduled for December 17.

New Plasticizers and Extenders

Amerigum, a series of plastic, resinous plasticizers and extenders for GR-S and other types of synthetic and natural rubbers, has been announced by the American Alkyd Industries, Inc., Broad and 14th St., Carlstadt, N. J. These new materials are said to have shown exceedingly high tensile, elongation, and good tear resistance. According to the manufacturer, the Amerigums are now in commercial production and will be available immediately.

Opens Consultant Offices

Wilburn F. Bernstein, formerly chief chemical engineer of the Victor Manufacturing & Gasket Co., has announced the opening of consultant engineering offices under his own name at 1 North LaSalle St. in Chicago 2, Ill. The telephone number is Central 3491. Mr. Bernstein is prepared to handle consulting problems of all types concerning rubber and synthetic rubber.

CANADIAN NEWS

Sufficient old tires and tubes have been assembled to meet the needs of the Fairmont Company, Ltd.—a government company purchasing such supplies—and payment of freight on shipments will be discontinued January 15, according to an announcement issued late in November by the War Services Salvage Division. For two years the collection of old tires and tubes has been one of the intensive salvage activities, officials pointed out.

"Thanks to the splendid cooperation of the Canadian public and voluntary salvage committees touching the Dominion-wide campaign for old tires and tubes, and the greatly improved supply position of synthetic rubber, the Department of Munitions and Fairmont Company, Ltd. have such stock reserve supplies of this salvage material on hand as appear adequate for their requirements," the announcement stated.

After January 15 the Fairmont Company will continue to pay the same prices as at present for tires and tubes, f.o.b. Fairmont yards at Toronto or Montreal, and all shippers must pay the freight charges on all shipments thereafter. The salvage division advised that salvage committees should not collect tires and tubes after January 15 unless they have, in advance, an understanding with scrap dealers and other disposal channels as to a definite outlet and price to be paid.

"Unless you, and all American tire owners, continue to make the preservation of tires a vital personal problem, our home-front transportation will break down and slow up the war production of America," said George Sawin, president of the B. F. Goodrich Company of Canada, Ltd., in an address before the Kitchener-Waterloo Rotary Club, at Kitchener, Ont., on November 27. He predicted that there will be an even greater shortage of tires in North America in 1944. "The rubber supply crisis is past, but the long-predicted and anticipated tire shortage is with us," he said. "The way out is for you to conserve the tires you've got, stretch their life in every way you can." Mr. Sawin gave suggestions as to how tires can be made to last longer and discussed the properties of the new synthetics.

The Montreal Board of Revision has reduced the municipal valuation of five properties of the Dominion Rubber Co., Ltd., from $1,011,000 to $982,250, according to Camille Tessier, K. C., chairman of the board. The properties involved are the five known as the Papineau plant.

Officials of the Seiberling Rubber Co. of Canada entertained F. A. Seiberling and C. W. Seiberling, chairman of the board and vice-president, respectively, of the Seiberling Rubber Co., Akron, at a banquet in the Royal York Hotel, Toronto, on November 13, held in celebration of the Canadian company's 15th anniversary. The Seiberling brothers were in the city to inspect an addition to the Toronto plant in which synthetic rubber will be processed.

J. P. Seiberling, president of the Akron company, speaking before government and industrial officials in attendance at the banquet, stated his belief that Americans would oppose taxing crude rubber to protect the synthetic rubber industry. Mr. Seiberling said he believed that the synthetic vs. crude dispute would be settled by "practical economic necessities" rather than by "politics or emotionalism" and predicted that public pressure would prevent a tariff on crude rubber imports after the war.

"If natural rubber is superior in quality to synthetic rubber for most uses and can be produced at lower cost—both of which circumstances I believe will prevail after the war—I feel sure my countrymen will be sufficiently realistic to oppose the placing of a tax upon a superior raw product in order to insure their use of a less satisfactory substance," he said.

Touching on the world trade question, Mr. Seiberling said he believed United States rubber manufacturers would return to buying crude rubber from the Far East, although they will never again depend wholly on those sources for essential supplies.

"Now that the United States has learned how to manufacture synthetic rubber and is learning how to use it, in the event of future wars cutting off its crude rubber supply, it will not be subjected to the delay involved in the present war because of lack of 'know how'," he said. "Practical economic considerations will determine the competition between natural rubber and synthetic rubber, and in that competition the advantages are mostly with the former."

"Labor has defeated its own cause in this country by holding a proverbial gun not at the enemy but at the head of Canadian industrial leaders since the beginning of the war," declared Judge F. T. Enright in the Criminal Court in Montreal on November 17. Judge Enright made the declaration before he imposed a $500 fine, plus costs, or six months imprisonment, on Omer Gaucher, organizer of the Trades and Labor Congress of Canada. Gaucher pleaded guilty to suggesting to employees of the Dominion Rubber Co. that they reduce their production of war material by 20%.

By an order of the Canadian Rubber Controller, recently published in a customs memorandum, the definition of "rubber" has been changed to read as follows: "Rubber means crude natural rubber in all its forms, and without restricting the generality of the foregoing, includes liquid latex of natural rubber not compounded beyond the addition of preservative, unmanufactured balata, unmanufactured gutta-percha, unmanufactured guayule and synthetic rubbers known as GR-S (Buna S), GR-I (butyl) and GR-M (neoprene)."

Aromatic Petroleum Solvents

The greater solvent resistance of neoprene and Buna N-type synthetic rubbers demands the use of aromatic petroleum solvents and/or aromatic solvents. In order to familiarize the rubber manufacturer with the trade names and sources of some of the aromatic petroleum solvents, the Office of the Rubber Director recently requested the Chemicals Division of WPB to compile such a list. This list, covering solvents containing some benzol, solvents in the toluol range, and solvents in the xylol range, is now available and can be secured by writing to Dr. H. E. Simmons, Office of the Rubber Director, Washington, D. C. It is pointed out, however, that all of the solvents listed are under allocation according to Order M-150, and the status of their availability will change from time to time.

Grant Heads Trade Group

A. L. Grant (Charles T. Wilson Co.), was elected president of the Rubber Trade Association of New York at the board session following the annual meeting of the organization, held on December 6. Other officers elected were: vice-president, G. LeRoy Scheinler (Robert Badenhop Corp.), and treasurer, Jacobus F. Frank. B. G. Davy was reappointed as secretary-manager of the Association. The following were elected to serve as directors for the ensuing year: *Dealers' Group*—Messrs. Grant and Scheinler, William T. Baird, Jr. (Baird Rubber & Trading Co.), R. S. Hamilton (H. A. Astlett & Co.), J. Louis (Littlejohn & Co.), and Herbert E. Meyer (Meyer & Brown Corp.); *Brokers' and Agents' Group*—Mr. Frank, Phillip Billhardt and Louis V. Keeler (Avia Company).

Tire Dealers Honor Jeffers

The National Association of Independent Tire Dealers on November 29 presented a bronze plaque to William M. Jeffers, president of the Union Pacific Railroad, for "the honorable performance of his duties, for his fairness and perseverance" while serving as the country's rubber administrator. Clifford C. Simpson of Washington, general manager of the association, made the presentation at Omaha, Neb.

LOS ANGELES NEWS

The Lamb Rubber Corporation, headed by Charles Lamb, Jr., is now located at 801 Milford Street, Glendale. Mr. Lamb states that new equipment is arriving every week and that the staff of workers is increasing. The building is 135 by 75 feet in dimensions, approximately five times the space of the original building occupied by this new company. The factory turns out mechanical rubber goods, airplane parts, oil well supplies and abrasive wheels. Three men were added to the shop staff in the last few days before this writing.

A. F. Pond and C. A. Neville, technicians for the United States Rubber Company, were due to return about December 17 from Detroit, Michigan, where they visited the plant in that city.

Walter E. Boswell, of the Thiokol Corporation, was due to return to Los Angeles from Trenton, N. J., about December 18. He spent a short time at the New Jersey city on a business mission.

The Erwin E. Miller Company, of Fullerton, California, near Los Angeles, has changed its name to the Fullerton Manufacturing Company, due to a recent change of managership.

The Standard Rubber Company, Inc., has completed two new buildings at the new location, 1500 E. Gage Avenue, Los Angeles. Floor space is in excess of 30,000 square feet. At this writing considerable moving is going on. The old location at 1580 E. Slauson Street, however, is not being abandoned. All mail should be addressed to the new address. The new buildings are very carefully arranged for maximum production. Charles Sickels is now sales manager.

Dates are set for the annual Christmas parties at the big tire and rubber company plants. At the Goodyear plant the Honorable Mr. Santa Claus was scheduled to greet the three thousand children of the employees at a regular party and Christmas tree event on the grounds.

Mr. Claus has been a bit hampered in the matter of transportation these recent years due to the grounding of his blimp, a bulging looking creation that replaced his reindeer some years ago. For several years he was accustomed to arrive in this contraption, cutting several graceful circles in the air before landing.

Uncle Sam headed off this method of travel when the war became serious and now Mr. C. just shows up from nowhere and after his boisterous greeting gets busy distributing the thousands of gifts piled about the tree.

Edward L. Royal, of H. M. Royal, Inc., has returned from a trip to New York, Trenton, N. J., and Baton Rouge, Louisiana. Incidentally, Mr. Royal was recently elected a life member of the Los Angeles Rubber Group.

Howard C. Lien has again taken charge of the Atlas Sponge Rubber Company which he leased for a period to the Kirkhill Rubber Company. The address is 806 E. 61st Street. He expected to begin operations by January 1. After leasing the factory, Mr. Lien went back to Minnesota and lived for a time on his farm but says he found the north country too cold after having spent so much time in a semi-tropical area.

The Typrene Rubber Company has opened a new factory at 1504 East Fourth Street. Clark Tyler is the owner. The new location gives a great deal more floor space. The old address was 5811 Wilmington Avenue. New equipment has been added and the entire plant arranged for greater efficiency and increased production. The floor area is 4,200 square feet. The whole plant is devoted to the production of printing and industrial rollers.

A. C. Banta is the new chief chemist for the Golden State Rubber Mills, 657 E. 61st Street. Mr. Banta was with the Kirkhill Rubber Company for about 18 months before joining the force at the Golden State Rubber Mills. James Hague, formerly with the Sierra Rubber Company, is now in charge of production and personnel at this plant. Carl Stentz, general manager, states that business is on the increase.

Deny Wire Fraud Charges

The Acorn Insulated Wire Co., of Brooklyn, N. Y., and two of its employees, James Colmer, plant superintendent, and Alec Colmer, foreman, entered pleas of not guilty in Brooklyn Federal Court on December 7 to charges of defrauding the Federal government in the manufacture and sale of field wire for the Army Signal Corps. The charges were handed down by the Brooklyn Grand Jury on November 30 and accused the company and the two employees of switching approval tags and seals from reels of wire approved by the War Department to other material allegedly known to be defective. The defendants were further charged with "having circumvented inspection tests by means of false and fictitious tests" and by the use of "tricks to prevent the detection of defects." The trial has been set for January 10.

Baty Joins C. P. Hall Co.

J. A. Baty

As reported in our previous issue, Dr. Joseph A. Baty has joined the C. P. Hall Co., of Akron, Ohio, as technical director. Prior to joining C. P. Hall, Dr. Baty was associated with the General Laboratories of the U. S. Rubber Co. at Passaic, N. J., for eight years. The new technical director is already established in his new quarters and has begun servicing accounts for the C. P. Hall Co.

The practice of satisfying the high native sulfur consumption demand by withdrawing substantial tonnages from stock piles to supplement a moderate production rate was continued in October, according to figures released by the Bureau of Mines. Production, mine shipments, and apparent sales were at approximately the same levels as in the previous three months and stocks were reduced by 94,767 tons.

An article on the history and manufacture of extruding machines by Justin H. Ramsey, vice-president of John Royle & Sons, Paterson, N. J., appears in the December 15 issue of *The Royle Forum*, company house organ.

"Give Your Product a Pleasant Odor" is the title of an article in the September-October issue of *The Givaudanian*, house organ of Givaudan-Delawanna, Inc., in which it is pointed out that odor problems are not necessarily limited to the use of temporary inferior substitutes. Synthetic rubbers are given as an example and the reader is counseled that, if he has any ideas up his sleeve for new post-war products, he would do well to see about the odor.

OBITUARIES

Thomas F. O'Neil

Thomas F. O'Neil, vice-president of General Tire & Rubber Co. and brother of William O'Neil, its president, died in St. Francis Hospital, Miami Beach, Fla., on December 10 following an operation. He was 52 years of age. Mr. O'Neil's death came unexpectedly, as he had been ill less than a week. A year ago he underwent another operation from which he apparently had been making a satisfactory recovery.

One of the founders of General with his brother, William, and their father, the late M. O'Neil, he was born in Akron on August 25, 1891. He was graduated from St. Vincent's High School and Notre Dame University. While at the university, Mr. O'Neil was editor of the Notre Dame *Scholastic* and the 1913 year book. He majored in engineering and later supervised the erection of several buildings in Akron for his father.

In May, 1917, two years after General was organized, Mr. O'Neil enlisted in the Navy and served in the first World War, being mustered out in February, 1919, as an ensign. He was a member of the Bath Club of Miami Beach, where he made his home, and in Akron was a member of the City Club, the Portage Country Club, the Knights of Columbus, and the Elks.

Besides his brothers, William and A. F., of Akron, and Cyril, of Cleveland, and two sisters, Mr. O'Neil is survived by his widow, four daughters, and three sons.

Charles F. Austin

Charles F. Austin of Akron, associated with the engineering department of the Goodyear Tire & Rubber Co. for 23 years, died suddenly on his way to the plant on December 8. Mr. Austin suffered a cerebral hemorrhage on the street and was pronounced dead at St. Thomas Hospital. He was a graduate of Cornell University and a member of the Odd Fellows. Mr. Austin is survived by his widow.

George W. Henne

George W. Henne, who assisted in reorganizing the Mansfield Tire & Rubber Co. in 1912 and later founded the old Columbia Tire & Rubber Co., died at his home in Mansfield, Ohio, on December 4. He had been in failing health for the past two months and was 71 years of age.

A native of Troy, Ohio, Mr. Henne moved to Mansfield in 1912 and with his brother re-established the Mansfield Tire & Rubber Co., which he headed for seven years, resigning in 1919 to found the Columbia Tire & Rubber Co., of which he was president for a number of years.

A charter member and past president of the Mansfield Chamber of Commerce, he was active in civic and business affairs in the city over a period of 30 years, being one of the organizers of the Manufacturers' Club in Mansfield. He was a member of St. Peter's Catholic Church.

Mr. Henne is survived by his widow, a son, and three daughters.

Michael Doyle

Michael Doyle, president of the International Pulp Co., New York City, for the past 40 years and also head of the United States Talc Co. and of the Union Talc. Co., died of pneumonia in Regent Hospital, New York City, on November 26. His age was 83.

Born in Ireland, Mr. Doyle came to America as a youth and settled in Rochester, N. Y., where he later became one of the founders of the Chamber of Commerce of that city, serving as its president in 1904. Mr. Doyle was active in numerous business fields, his first venture having been in the fruit exporting trade, for which he established Michael Doyle & Co. Long active in civic and charitable organizations of Rochester, he was one of the founders of Hahnemann Hospital there, now the Highland Hospital. He was a member of the Knights of Columbus and of St. John's Church, Rochester.

Frank Mulvey

Frank Mulvey, who retired last summer from his post as chief engineer of the power plant of the A. Schrader's Son Division of the Scoville Manufacturing Co., Inc., located at 470 Vanderbilt Avenue, Brooklyn, N. Y., died in the Elizabeth Horton Memorial Hospital, Middletown, N. Y., on November 24, after a month's illness. Born in Ireland, Mr. Mulvey had been associated with the Schrader organization for 38 years. He is survived by his widow, four sons, and two daughters.

Frank X. Berrodin

Frank X. Berrodin, head of the Berrodin Auto Supply Co., of Philadelphia, Penna., died at his home in Germantown, Penna., on December 8. Mr. Berrodin as a youth entered the tire business and for many years was associated with the rubber industry in various capacities. At one time he was employed together with John Gammeter in the bicycle and tire department of the B. F. Goodrich Co., later going to Erie, Penna., where he worked for the Pennsylvania Rubber Co. and the Hood Rubber Co. Subsequently he established the Berrodin Rubber Co., which later became the Berrodin Auto Supply Co. He is survived by his widow and two sons.

Ellery A. Baker

Ellery A. Baker, who was treasurer and director of the Dayton Rubber Manufacturing Co. until his recent retirement because of ill health, died on November 19 in Short Hills, N. J. He was 72 years of age.

Born in Stowe, Mass., Mr. Baker was chairman of Ellery A. Baker & Co., Inc., New York City, a management concern, and during World War I was an assistant vice-president of the National City Bank of New York. For many years he was associated with the management of the Monument Mills of Great Barrington, Mass., and the Worumbo Manufacturing Company of Lisbon Falls, Maine.

Mr. Baker was a member of the board of trustees of the Wyoming Presbyterian Church of Milburn, N. J., and his clubs included the Manhattan and the Algonquin of Boston.

Frank C. Millhoff

Frank C. Millhoff, a prominent Akron industrialist before his retirement from the rubber industry and an ardent sponsor of the "Buy American Made Goods" campaign, died at his home in Fairlawn on December 10. He was 67 years of age, having been born in Akron on July 4, 1876.

Mr. Millhoff formerly was vice-president of the Master Tire & Rubber Corp. and for 17 years was sales manager of the Miller Rubber Co., with which he started in 1911. Early in his career he organized the M. & M. Manufacturing Co., which made cement and acids for the rubber trade. He is survived by his widow and a daughter.

Edward C. Gammeter

Edward C. Gammeter, long prominent in Akron business circles and brother of John Gammeter, well known Akron inventor, died of a heart attack on December 3 at his home. Mr. Gammeter, a life resident of Akron, was associated with the Conart Motor Sales Co. and the Killian Manufacturing Co. He leaves three daughters and a son.

Mrs. Roger S. Firestone

Mrs. Mary Seagrave Davis Firestone, of 115 E. 77th Street, New York City, wife of Lieut. Roger Stanley Firestone, USNR, son of the late Harvey Firestone, died November 30 in LeRoy Sanitarium shortly after the birth of a son, John D. Firestone. Her age was 28.

RESIN COLLOIDS

Emulsions - Dispersions - Resin Solutions

Many of the new products developed from Resin Colloids in the form of *emulsions, dispersions,* and *resin solutions* are being used today to replace, extend, or supplement those materials which are no longer available or are in short supply.

Our technologists have succeeded in developing a number of products whose properties equal, and in many cases actually exceed, the materials formerly used. Listed below are a few of the uses to which Resin Colloids in various forms have been put in the rubber industry:

- **Adhesives**
- **Buna Modifiers**
- **Butyl Rubber Emulsions**
- **Coating Compositions**
- **Impregnants**
- **Latex Extenders**
- **Neoprene Modifiers**
- **Protective Coatings**
- **Shellac Alternates**

AMERICAN RESINOUS CHEMICALS CORPORATION

Rubber Substitutes • *Rubber Synthetics* • *Resin, Lacquer Emulsions*

MAIN OFFICE and LABORATORIES

PEABODY, MASS.

Factory Branches: Newark, N. J. and Chicago, Ill.

Never mind "who done it"—pitch in and help get it down!

THIS IS YOUR UNCLE SAM talking—but I'm going to talk to you like a DUTCH uncle, to keep all of us from going broke.

Ever since the Axis hauled off and hit us when we weren't looking, prices have been nudging upwards. Not rising awfully fast, but RISING.

Most folks, having an average share of common sense, know rising prices are BAD for them and BAD for the country. So there's been a lot of finger pointing and hollering for the OTHER FELLOW to do something—QUICK.

The government's been yelled at, too. "DOGGONNIT," folks have said, "WHY doesn't the government keep prices down?"

Well, the government's done a lot. That's what price ceilings and wage controls are for—to keep prices down. Rationing helps, too.

But let me tell you this—we're *never* going to keep prices down just by leaning on the government and yelling for the OTHER FELLOW to mend his ways.

We've ALL got to help—EVERY LAST ONE OF US.

Sit down for a minute and think things over. Why are most people making more money today? It's because of the SAME cussed war that's killing and maiming some of the finest young folks this country ever produced.

So if anyone uses his extra money to buy things he's in no particular need of . . . if he bids against his neighbor for stuff that's hard to get and pushes prices up . . . well, sir, he's a WAR PROFITEER. That's an ugly name—but there's just no other name for it.

Now, if I know Americans, we're not going to do that kind of thing, once we've got our FACTS straight.

All right, then. Here are the seven rules we've got to follow as GOSPEL from now until this war is over. Not some of them—ALL of them. Not some of us—ALL OF US, farmers, businessmen, laborers, white-collar workers!

Buy only what you need. A patch on your pants is a badge of honor these days.

Keep your OWN prices DOWN. Don't ask higher prices—for your own labor, your own services, or goods you sell. Resist all pressure to force YOUR prices up!

Never pay a penny more than the ceiling price for ANYTHING. Don't buy rationed goods without giving up the right amount of coupons.

Pay your taxes willingly, no matter how stiff they get. This war's got to be paid for and *taxes are the cheapest way to do it.*

Pay off your old debts. Don't make any new ones.

Start a savings account and make regular deposits. Buy and keep up life insurance.

Buy War Bonds and hold on to them. Buy them with dimes and dollars it HURTS like blazes to do without.

Start making these sacrifices now—keep them up for the duration—and this country of ours will be sitting pretty after the war . . . *and so will you.*

Uncle Sam

KEEP PRICES DOWN!

Use it up • Wear it out
Make it do • Or do without

This advertisement, prepared by the War Advertising Council, is contributed by this magazine in co-operation with the Magazine Publishers of America.

NEW EQUIPMENT

Pneumatic Indicating Controller

A new Celectray Pneumatic Indicating controller, the first instrument of its type which does not employ a motor or other continuously moving parts, has been developed and introduced by the C. J. Tagliabue Mfg. Co., of Brooklyn, N. Y. Features of the new instrument include the following: No motor, continuous action, no measurable "dead zone," highest sensitivity and adjustment to very low sensitivity, no mechanical

connection between galvanometer and pneumatic circuit, no "flapper," and simple load error adjustment (manual reset).

The original Celectray controller, with its mirror galvanometer and photo electric amplifier, is combined in the new instrument with a pneumatic follow-up without losing any of its characteristics. The output air is precisely and stably controlled to provide the utmost in performance, according to the inherent possibilities lying in ordinary throttling control with manual reset or with automatic reset and/or TAG's "quick response." On-and-off or open-and-shut control is available in two models, high sensitivity, non-adjustable throttling or on-and-off without throttling.

The measuring circuit in the new instrument, including the galvanometer and the photoelectric system are identical with the standard Celectray Controller, but in place of the relay found in that controller there has been substituted a magnetic air-valve which acts as an amplifier and converter from electric to pneumatic operation.

The light beam "follow-up" flag is moved back and forth by changes of the air pressure in the bellows of the "follow-up" assembly unless the sensitivity-adjusting arm is turned to the highest sensitivity on its scale. With this adjustment, the throttling range is zero, the flag stands still as the control pressure varies and the controller acts as an on-and-off or open-and-shut controller, opening or closing the valve to its limits for small changes in temperature, for example.

As the temperature varies, the light image moves across the controlling edge of the flag and more or less of the light reaches the phototube. More light on the phototube causes more current to flow through the magnetic air valve. This in turn draws in the armature, moving the orifice tongue closer to the orifice in the block and raising the controlled air pressure. Less light on the phototube thus lowers the controlled air pressure by decreasing the current to the magnetic air valve.

VULCANIZED
VEGETABLE OILS
—RUBBER SUBSTITUTES—

✦

Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods—be they Synthetic, Natural, or Reclaimed.

✦

A LONG ESTABLISHED AND PROVEN PRODUCT

THE CARTER BELL MFG. CO.
SINCE
CARTER BELL PRODUCTS
1903
SPRINGFIELD, NEW JERSEY

RUBBER
★
SYNTHETIC RUBBER
★
PLASTICS

THE Schuster
MAGNETIC CALENDER GAUGE
SAVES THAT MATERIAL

For upwards of 15 years, the Schuster Magnetic Calender Gauge has unerringly set rubber calender rolls to a predetermined thickness and correctly maintained that thickness. It has saved the time of handmiking, eliminated human error, saved the stock sampled for calender tests, and assured uniform thickness in the finished product.

All this, *at the right time—before* damage is done. And *continuously*—the only way worth while.

The instrument is simple in design . . . rugged in construction . . . practically without wearing parts . . . adjustable to any thickness. Originally used for rubber, it has taken over just as deftly for synthetic rubber, plastics, cellulose, and other media. No matter what the article, your coating must be thick enough, but not even 1/1000" too thick, or the war effort suffers irreparable loss. No matter what the material, you've got to s-t-r-e-t-c-h it as far as possible—and "possible" daily proves to have a new, elastic meaning.

Better investigate the Schuster Magnetic Calender Gauge at once, with or without automatic control. Every installation has to be engineered to the job . . . Please *give us time to do it right.*

Ask for our bulletin on the Schuster Magnetic Gauge.

THE MAGNETIC GAUGE COMPANY
60 EAST BARTGES STREET AKRON, OHIO
Eastern States Representative—
BLACK ROCK MANUFACTURING CO., Bridgeport, Conn.

Precision Cabinets and Baths

Precision Scientific Co., 1750 North Springfield Ave., Chicago 47, Ill., has extended its line of explosion-proof laboratory equipment to include electrically-heated temperature control cabinets and constant temperature baths. Such apparatus is regarded as essential for safety when handling inflammable or

explosive materials, or for operation in a hazardous atmosphere. All wiring is enclosed in vapor-tight explosion-proof conduit fittings to eliminate open arcs, in conformity with Underwriters' requirements applying to Class I, Group D, "Hazardous Location," and all electrical controls are mounted in explosion-proof housings. Heaters are of low wattage density for minimum temperature differential between air and heater surface. Heating elements are ribbon, to allow a large expanse of heat-dissipating surface for a given wattage, and operate at black heat. The thermostat is located in a separate compartment away from the working chamber, and is enclosed in an explosion proof metal housing. Doors are equipped with a safety release latch to allow automatic opening for releasing any internal pressures which may develop, and a door switch automatically disconnects entire electrical circuit including the heaters, thermostat and control switches, when door is opened. Illustrated is a temperature control bath available for reduced or elevated temperatures in a variety of sizes and operating characteristics.

New Foxboro Vernier Valvactor

New capabilities, as well as new convenience and sturdiness, are featured in a new Foxboro Vernier Valvactor, recently announced by the Foxboro Co., Foxboro, Mass. The Valvactor is a micro-positioner for pneumatic motor valves and is used to insure precise and dependable valve response, especially where operating conditions may make the response uncertain, slow or unsatisfactory.

The new construction involves a completely different arrangement of the actuating elements. New ease and range of adjustment, especially for duplexing and sequencing, and new snap action, for relay service or step sequencing of valves or damper motors, are provided by new, convenient zero and range adjustments. New ease of reversal is provided, without change of parts or piping.

The new unit retains the outstanding advantage of relay action. Flexure type bearings, in place of pivots, eliminate the effects of mechanical vibration, without loss of sensitivity.

Mark Rubber and Synthetic Products with

KAUMAGRAPH

Dry

Transfers

Reproduce trade-marks or lettering on your product for attractive, safe, economical identification. The research and experience of over 40 years in supplying identification for textiles, rubberized fabrics, artificial leather and other products is at your disposal.

Send a sample of your product and we will show you how Kaumagraph Dry Transfers can mark it.

KAUMAGRAPH
Wilmington, Delaware

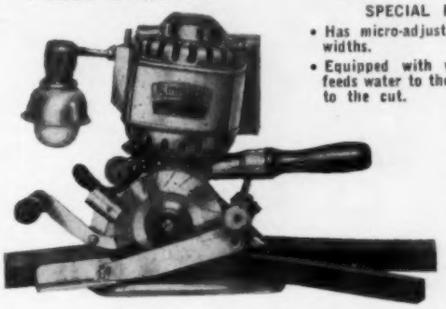
IDENTIFICATION HEADQUARTERS SINCE 1902

SIMPLEX
REG. TRADE MARK

RUBBER STRIP CUTTER

PATENTED

A PORTABLE machine capable of stripping slab rubber up to 1" thick at the rate of 20,000 feet in 8 hours. Any width desired.



SPECIAL FEATURES

- Has micro-adjustment for accurate widths.
- Equipped with water tank which feeds water to the slotted knife and to the cut.
- Has repulsion-induction motor which carries any overloads.
- Automatic sharpener device keeps knife keen and sharp.
- Has base with rollers and is very easy to handle.

Cuts within 1/64 inch to 1/100 inch tolerance depending on grades of rubber. Cuts a slab down to the last shaving. Cuts all grades of rubber including pure gum, sponge, etc. Cuts squarely—no rejects.

Now in use by many leading Rubber Manufacturers & Jobbers

Simplex Cloth Cutting Machine Co., Inc.

Manufacturers of a Complete Line of Cloth Cutting Machinery

270 West 39th St. New York, N. Y.

Cable Address—SIMPLEX, N. Y. *Phone*—WIsconsin 7-5547

SULPHUR *and* CHEMICALS FOR THE RUBBER INDUSTRY

CRYSTEX insoluble SULPHUR

Commercial Rubbermakers' Sulphur, Tire Brand, 99½% Pure

Refined Rubbermakers' Sulphur, Tube Brand, 100% Pure

Carbon Tetrachloride, Carbon Bisulphide

Caustic Soda, Sulphur Chloride

Stauffer CHEMICALS SINCE 1885

STAUFFER CHEMICAL CO.

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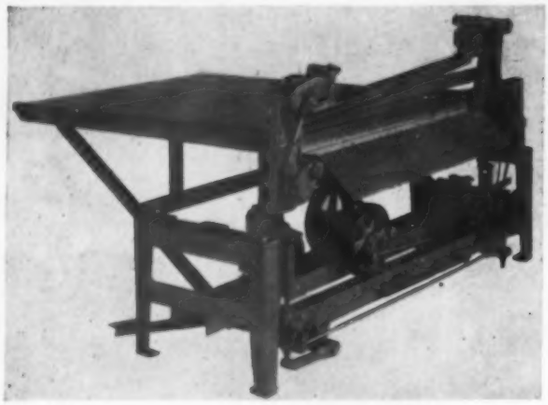
624 CALIFORNIA ST., SAN FRANCISCO 8, CAL.
HOUSTON 2, TEXAS
535 SO. FLOWER ST., LOS ANGELES 13, CAL.
424 OHIO BUILDING, AKRON 8, OHIO
NORTH PORTLAND, OREGON
APOPKA, FLORIDA

ELECTRIC SHEAR



42″ Electric Shear for cutting slabs or sheet material. A strong rugged machine. Hand feed, foot operated. Clamp automatically holds the material while being cut. Knife has self-honing action.

SPADONE MACHINE COMPANY

10 East 43rd St. New York 17, N. Y.

Representatives for ALFA MACHINE CO.

CHEMICALS BY GLYCO

CURING AGENT FOR POLYVINYL BUTYRAL.

PLASTICIZERS FOR SYNTHETIC RUBBER.

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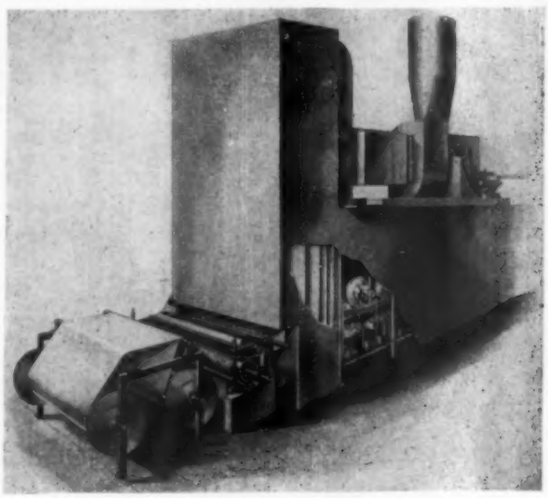
For complete information, send for our new catalogue, "Chemicals by Glyco."

Glyco Products Co., Inc.

26 Court Street, Brooklyn 2, New York

Improved Continuous Process Range

Based on its experience with finishing ranges in the textile field, the firm of H. W. Butterworth & Sons Co., Philadelphia, designed and built a continuous process range to impregnate rayon tire cord with latex solutions. This range was described and illustrated



in the May, 1943, issue of RUBBER AGE. The company has since continued its experiments and has recently put an improved model on the market, illustrated herewith. One of the larger tire manufacturers has been operating this machine at a speed better than 25 yards a minute, according to the Butterworth concern. A full description of the operation of the continuous process range will be found in the issue referred to above.

BRIEFS . . .

The **Miskella Infra-Vibra-Veyor,** a device for drying, pre-heating or dehydrating plastic powder and similar products, has been added to the special line of plastic equipment featured by Infra-Red Engineers & Designers, 1633 East 40th St., Cleveland, Ohio. It is said to contain all the major features of the company's large continuous 200-pounds-per-hour machine as well as the wide vibrator feed, combined with a stainless steel belt carrying the material to be processed under infra-red lamps at the rate of 1,000 pounds per hour.

Greater safety and ease of installation is said to feature a new design of **indoor dry-type transformers** for primary circuits 601 to 15,000 volts recently announced by the General Electric Co., Schenectady, N. Y. The new design gives the transformers an outward appearance of the latest model room-type air conditioning units, employing sheet steel with flowing lines, smoothly rounded corners, and a two-tone gray finish.

American Instrument Co., Silver Spring, Maryland, is now offering welded **pressure vessels** as a standardized line of units for certain types of high-pressure use, particularly in research and pilot plant work. The vessels were designed especially for the storage of compressed gases at pressures up to 6,000 lbs. per sq. in.

Your products are no better than the tools which guide their manufacture. Tools, molds, and gages engineered to ELECTRIX standards will enable you to operate more efficiently, with fewer rejects.

Consult us for:
GAGES • JIGS • FIXTURES
FORM TOOLS
MOLDS for Rubber and Plastics

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ELECTRIX *Corporation*

Peace-time engineers of soft-rubber connectors, sold exclusively through U. S. RUBBER COMPANY

144 MIDDLE STREET • PAWTUCKET, R. I.

CONTINENTAL MACHINERY CO.
305 BROADWAY - - NEW YORK, N. Y.

Designers and Manufacturers of

RUBBER PLANT EQUIPMENT

- All types of Rubber Machinery and Plant Equipment for every requirement of Large and Small Factories.
- Complete Plant Design and Layout; also Special Machinery Developed and Manufactured.
- Specialists in Latex Equipment.
- Complete Laboratory Facilities for Chemical and Product Development and Research.
- Technicians Furnished for Factory Design and Operation in all countries.

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Three types of CALCINED MAGNESIA for neoprene

WHITTAKER
ESTABLISHED 1890

These three types of calcined magnesia meet requirements of quality and cost:

- **LIGHT**—The highest type. For the most exacting compounds. Fine particle size. Low moisture and carbonate content.
- **MEDIUM**—For less exacting requirements and where costs must be kept down. Fine particle size and low moisture content.
- **HEAVY**—Meets low cost need where high type compounding is not essential.

Samples, prices and additional information on request

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Cleveland: Palmer Schuster Company

3343

WANTED
BROKERS
or Manufacturers Agents

There are still a few good territories open in which to represent the Erie Engine & Mfg. Co. line of Rubber Working and Plastic Molding Machinery. Interested brokers are urged to send in their applications, stating territory covered, qualifications and other details. All replies will be acknowledged.

See our advertisement on page 205

EEMCO Erie Engine & Mfg. Co.
953 East 12th St., Erie, Penna.

Manufacturers of RUBBER and PLASTICS Machinery

RUBBER AGE
One of the World's Outstanding Rubber Journals

Keeps the rubber industry posted on all current technical, news, market and statistical developments.
The indispensable rubber journal read by the industry's leading executives, engineers, chemists, buyers, salesmen, etc.
Annual subscription in U. S. — $3.00
RUBBER AGE
250 West 57th Street New York, N. Y.

WILBURN F. BERNSTEIN
Formerly Chief Chemical Engineer of Victor Mfg. & Gasket Co.
Announces the Opening of
Consultant Engineering Offices
One North LaSalle Street
Chicago 2, Ill. Central 3491

REVIEWS

BOOKS

Toxicology and Hygiene of Industrial Solvents. Edited by K. B. Lehmann and F. Flury. Translated by Eleanor King and Henry F. Smyth, Jr. Published by the Williams & Wilkins Co., Baltimore, Md. 6 x 9 in. 378 pp. $5.00.

The publication in English of this work, generally acclaimed as the most detailed and useful book on the subject, originally issued in German at the request of the medical committee of the German Society for the Protection of Labor, should be extremely valuable in effectively combatting what is probably the most widespread chemical hazard in the United States—exposure to solvents. This hazard has been a perplexing problem of the rubber industry since its birth and the large-scale entry of synthetic rubber has presented a few new tribulations.

Although the contents of the book is predominantly of a medical nature, anyone who has contact with industrial solvents will find it a source of information that is readily understood and applicable. Experimental-toxicological investigations form its nucleus, including studies of the hydrocarbons of the benzine and benzol series, the chlorinated hydrocarbons, the alcohols, esters, etc., and the glycol group. Around these studies are grouped discussions of chemistry and technology, chemical analysis, skin injuries, and dangers to health and health protection.

The book has eight chapters in all, as follows: (1) Chemistry, Technology, Preparation, and Use of Solvents; (2) Chemical Analysis of Solvents; (3) Some General Remarks on the Industrial Hygiene of Solvents; (4) General Toxicology of Solvents; (5) The Individual Solvents; (6) Skin Injuries; (7) Endangering Health and Protecting Health with the Use of Industrial Solvents; (8) Official Regulations.

•

Standards on Textile Materials. Prepared by Committee D-13 on Textile Materials. Published by the American Society for Testing Materials, 260 So. Broad St., Philadelphia 2, Penna. 6 x 9 in. 440 pp. $2.25.

In addition to each of the 78 standard specifications, tests, and definitions, etc., issued by the A.S.T.M. in its work in the field of textiles, this 1943 compilation of textile standards includes considerable related information and data on calculation of number of tests for textile materials, a yarn number conversion table, humidity tables, and abstracts of papers delivered last year. There are also several tests published for information and comment, including one on accelerated aging, and another on designation of yarn construction. An extensive glossary of terms gives a list of man-made and natural fibers, defects in woven fabrics, and terms relating to hand of fabrics.

•

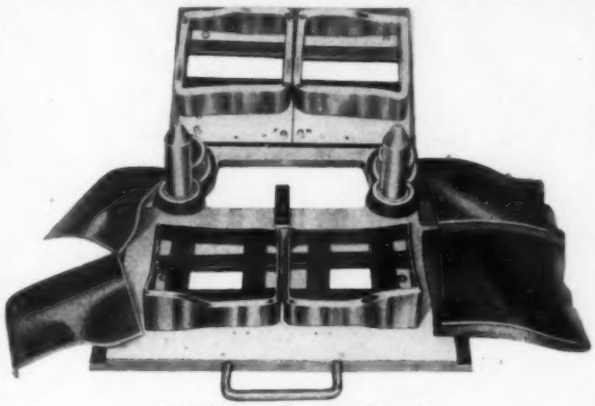
SPI Directory: 1943-44. Issued by the Society of the Plastics Industry, Inc., 295 Madison Ave., New York, N. Y. 6 x 9 in. 160 pp.

The Society of the Plastics Industry is a national organization covering both the United States and Canada, its membership constituting a thoroughly integrated unit in the industry, from producers of plastics raw materials through the molders, laminators and fabricators of the finished articles, in addition to the makers and suppliers of machinery and equipment. This directory, the first of its kind to be issued, lists all of the company and individual members of the Society. Although reflecting a war-time note, the directory lists typical peace-time products in its Product Index. A "Who's Who in Plastics" is also included. A history of the Society is given.

D|C

SHARP EDGE CUTTING DIES

Also TOOLS, DIES, JIGS, FIXTURES
MACHINE PARTS and SPECIAL MACHINERY



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Now Engaged in Prime and Subcontract Work—Defense and Civilian

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INDEPENDENT DIE & SUPPLY CO.
LaSalle & Ohio Sts., St. Louis 4, Mo.

NEVILLE

For your wartime formulas . . .

Dibutyl Phthalate

★ *We solicit your inquiries*

R-7

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PITTSBURGH • PA. M-90
Chemicals for the Nation's War Effort

BENZOL • TOLUOL • XYLOL • TOLUOL SUBSTITUTES • CRUDE COAL-TAR SOLVENTS
HI-FLASH SOLVENTS • PAINT AND VARNISH REMOVERS • COUMARONE-INDENE RESINS
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GRANULATED CORK

FOR EXTENDING RUBBER

SOUTHLAND CORK COMPANY
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AIR BAG BUFFING MACHINERY
STOCK SHELLS HOSE POLES
MANDRELS
NATIONAL SHERARDIZING & MACHINE CO.
868 Windsor St. Hartford, Conn.
Representatives: Akron San Francisco New York

SPECIALIZING IN
USED MACHINERY FOR THE **RUBBER**
AND ALLIED INDUSTRIES
MILLS, CALENDERS, HYDRAULIC PRESSES,
TUBERS, VULCANIZERS, MIXERS, ETC.
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BEACON
PALMALENE
A synthetic fatty acid for the rubber industry
Specifications: Saponification No. 180-185;
Iodine Value, 55-60; Titre, 35.

THE BEACON COMPANY
97 Bickford St., Boston, Mass.
In Canada: Prescott & Company Reg'd., 774 St. Paul St. W., Montreal

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EQUIPMENT for the HANDLING of
BULKY • CASED • HEAVY

EQUIPMENT for the PROCESSING of
CHEMICAL • FOOD • PLASTIC

MATERIALS

Cranes, Elevators, Lift & Trailer Trucks, Conveyors, Live Skids, Drum Hoists, Tool Wagons, Carts, Winches

Crushers, Pulverizers, Grinders, Reducers, Cutters, Blenders, Mixers, Sifters, Attr. and Hammer Mills.

WRITE FOR DETAILS

MERCER-ROBINSON COMPANY INC
30 CHURCH ST NEW YORK 7 N Y

CONTINENTAL-MEXICAN RUBBER CO., Inc.
745 Fifth Ave., New York City

Producer in Mexico of

GUAYULE RUBBER

Washed — AMPAR BRAND — Dried

Formerly Distributed By
CONTINENTAL RUBBER COMPANY OF NEW YORK
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Let us estimate on your

CUTTING DIES

● Years of experience making dies of all kinds for rubber manufacturers enable us to offer you correctly designed dies of tempered steel which retain their cutting edges....*Send blue print for quotation.*

BROCKTON CUTTING DIE & MACHINE CO. INC.
CUTTING AND PERFORATING DIES

AVON, MASS.

New and Better
GAMMETER'S
ALL STEEL ALL WELDED
CALENDER STOCK SHELL

4" - 5" - 6" - 8" - 10" - 12" diameters, any length.

Besides our well known Standard and Heavy Duty Constructions, we can supply light weight drums made up to suit your needs.

THE W. F. GAMMETER COMPANY
CADIZ, OHIO

Stearns
MAGNETIC
CLUTCHES AND BRAKES
CLUTCH - BRAKE COMBINATIONS

This 24" diameter STEARNS Magnetic clutch and Brake Unit is providing smooth start and positive stop on a rubber mill in a prominent mid-western plant. Efficient, economical and safe, sizes and combination to meet requirements. Write for bulletin 225.

If you have a tramp iron problem ask for our Bulletin 301 on Magnetic Pulleys, improved, air-cooled, latest design. Sizes to fit your conveying system or self contained unit.

We invite your inquiries. Outline your problem. No obligation.

STEARNS MAGNETIC MFG. CO.
640 So. 28th St. Milwaukee (4), Wis.

Encyclopedia of Substitutes and Synthetics. Edited by Morris D. Schoengold. Published by Philosophical Library, Inc., 15 East 40th St., New York, N. Y. 6 x 9 in. 382 pp. $10.00.

This is a compilation of so-called substitute materials intended to replace hard-to-get materials. In many cases not only are the substitute materials listed, but some data on their physical and chemical properties is given. The subject matter covered ranges far and wide, ranging from abietic acid to zirconium oxide. Brand names are, of course, included. The author has made every attempt to include the most recent developments in all fields, but as he points out in his preface, certain omissions were unavoidable due to the rapid technological advances as a result of the war. The book, however, should serve as a good starting point in the hunt for replacement materials.

Printed in fairly large size type, with liberal spacing between items listed, the book is a handy reference work. Numerous substitutes and replacements for rubber are included, as well as materials used in the compounding of natural and synthetic rubber and those used in the manufacture of the compounding ingredients themselves. An index of trade names, woefully short, is included, in addition to a subject index.

●

Plastics (2nd Edition). By J. H. DuBois. Published by the American Technical Society, Drexel Ave. at 58th St., Chicago, Ill. 5½ x 8¼ in. 435 pp. 203 ill. $3.75.

Since the first edition of this book was published in 1942 (see RUBBER AGE, November, 1942), tremendous strides have been made in the plastics industry and, therefore, to bring this new and enlarged edition up-to-date the author has added 144 entirely new pages. The new material covers the various types of synthetic rubber (this chapter now covering 59 pages), low pressure laminating, trends and developments, and general properties and uses for molded plastic materials. Some minor changes were made in the original material. In its revised form the book may still be termed a simplified presentation of the manufacture and use of the important plastics materials and products, with tables of their properties and the basic design information required by engineers and designers. There are now 18 chapters in all and a carefully cross-referenced subject index. The chapter on synthetic rubber is well done.

BOOKLETS, CATALOGS, Etc.

A.B.C. of Electronics at Work. Westinghouse Electric & Manufacturing Co. (Dept. 7-N-20), East Pittsburgh, Penna. 5 x 7 in. 36 pp.

The fundamental principles of the six basic ways in which electronic tubes function are explained in this new booklet. Schematic drawings of the tube construction and diagrams showing the typical circuits for the various functions are used to explain how these tubes rectify, amplify, generate, control, transform light into current and current into light. Industrial and military applications for each of the six basic functions are described and illustrated. High frequency heating, dynetric balancing, resistance welding control, radio and radio-telephony, television, Precipitron, industrial and medical x-ray are a few of the electronic devices that are included.

●

Naftolen for GR-S. Wilmington Chemical Corp., 10 East 40th St., New York, N. Y. 8½ x 11 in. 4 pp.

This technical bulletin briefly outlines the fundamentals of successful compounding of GR-S-Naftolen stocks. It includes a description of Naftolen, scope of application, rules of compounding, processing properties, and some data on soft rubber Buna S compounds. Test results on seven different compounds are given.

The Rubber Industry and the War. Prepared and issued by the Rubber Manufacturers Association, 444 Madison Ave., New York, N. Y. 8½ x 11 in. 80 pp.

This booklet was prepared to tell Mr. and Mrs. John Howard, typical Americans, how the rubber industry has taken on three specific jobs in the war effort, and taken them on with a speed and drive that spells inevitable doom for the enemy. The three specific jobs are: (1) to make all rubber products essential to win the war—and invent new ones to win it quicker; (2) To make other non-rubber products that have to be made to win the war; and (3) To make the rubber itself—synthetically. How these objectives are being accomplished is told in words and pictures, with emphasis on the latter, in three separate sections. The booklet is attractively presented in three colors and, in our opinion, represents the best public relations job yet done for the over-all rubber manufacturing industry of the United States. It is picturesque and factual, and should be given the widest possible distribution.

•

Evaluation of Mixtures of Silene EF and Calcine T in a GR-S Composition and Comparisons of Accelerators and Accelerator-Sulfur Combinations in Silene EF-GR-S Compositions. (Data Sheet No. 43-5). Columbia Chemical Division, Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh, Penna. 8½ x 11 in. 12 pp.

As indicated by its title, this data sheet contains two laboratory reports of interest to compounders working with GR-S. The first report shows how the physical properties of non-black stocks can be varied through a considerable range of modulus by varying ratios of Silene EF and Calcene T. The second shows results obtained with 40 volumes of Silene EF with several different accelerations and the effect of varying sulfur level with one accelerator. The results indicate that with accelerators requiring sulfur and with fairly high Silene EF loading, at least 2% of sulfur on the GR-S is needed to develop reasonably normal tensile strengths.

•

Manhattan Rubber Products for Industry. Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J. 8½ x 11 in. 138 pp.

Although described as a catalog of Manhattan rubber products, this could well be considered a "manual" of mechanical rubber goods. It is one of the most complete and extensive catalogs offered by any rubber manufacturer and covers a multitude of items. It has several distinctive features, including a sectional and marginal index for quick reference, a loose-leaf system arranged for inclusion of revisions to keep it permanently up-to-date, and a section of "Flexlastics," the name given by Manhattan to elastic products combining flexibility, elasticity and lasting service. Engineering data on belting and hose and technical information on other mechanical goods is included. The edition represents the Golden Anniversary Catalog.

•

Rio Resin for Use in GR-S Products. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 8½ x 11 in. 12 pp.

Tensile properties and shore hardness of various stocks containing Rio Resin, a new granular resin-like material, with a melting point of approximately 75°C., are given in this laboratory report. The report indicates that loss in elongation and increase in hardness, which mark GR-S products after aging, and which are naturally accompanied by poor flexing and bad cracking and tearing properties, can be considerably modified by the incorporation of Rio Resin in some types of GR-S goods. Captax-Selenac compounds with Rio Resin are said to be outstanding.

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•
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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, Dec. 14, 1943

Crude Rubber

AFTER a group of reporters returned from a conducted tour of rubber-producing areas in Latin America, as reported last month, they criticized the fact that despite all efforts they were unable to determine two specific points in the government's wild rubber collection campaign, i.e., the total amount of the rubber being received and the exact cost per pound of that rubber. Estimates on costs made by these reporters ranged from 70c to $500 per pound. In the past week the answers to both of these points were furnished by Douglas Allen, president of the Rubber Development Corp.

Appearing before the special Senate committee investigating the war program, better known as the Gillette Committee, Mr. Allen revealed that the total of all disbursements by the Rubber Reserve Co., and its successor, the Rubber Development Corp., through December 31, 1943, will reach $83,162,823. Actual imports of crude rubber from all Western Hemisphere sources from April, 1942, the start of the program, through the end of this year, including the rubber content of tires and tubes acquired, will amount to 45,000 tons. This gives a cost for wild rubber from all Western Hemisphere sources of 82c a pound.

Major criticism has been levelled at the agency's handling of rubber in the Amazon area, and special attention was paid to this phase by Mr. Allen. He estimated that total imports from the Amazon from April, 1942, to December 31, 1943, will reach 23,700 long tons, for a cost of $1.12 per pound. The tonnage figure includes the rubber content of tires and tubes acquired. If total disbursements are pro-rated over the full length of the contracts under which we are now securing rubber from Latin America, the net cost per pound will be about 75c per pound.

Prices shown below are those set by the Rubber Reserve Company:

	C	N-C
Plantations—		
Ribbed Smoked Sheets, 1X	22½	40
Thick Pale Latex Crepe, 1X	22½	40
Thin Pale Latex Crepe, 1X	22½	40
Thick Brown Crepe, 1X	21⅜	38⅞
Thin Brown Crepe, 1X	21⅜	38⅞
Thick Remilled Blankets, #1	21⅜	38⅞
Rolled Brown or Flat Bark	18	35½
Smoked Blankets, #1	21⅜	38⅞
Claro Brand 1XRSS	22½	40
Sole Crepe Trimmings	22	39½
Sole Crepe	22½	40
Wild—		
Uncut Fines, Crude	15	29
Cut Fines, Crude	15½	29¾
Cut Fines, Washed & Dried	22½	40
Upriver Coarse, Crude	12⅜	26⅛
Upriver Coarse, Washed & Dried	20¼	37¾
Caucho Ball, Crude	11⅜	24¾
Caucho Ball, Washed & Dried	19½	37
Guayule—		
Carload Lots	17⅛	31
Less than Carload Lots	18	31½
Balata—		
Surinam Sheet	42½	42½
Mannos Block	38¾	38¾
Colombian Block	38¾	38¾
Peruvian Prime	38¾	38¾
Chicken Wire	23¼	23¼
Latex—		
Normal, Tank Car Lots	26	43½
Creamed, Tank Car Lots	26¾	44¼
Centrifuged, Tank Car Lots	27¾	45¼
Heat-Concentrated, Carload Drums	29½	47

C, for Civilian Use; N-C, for Non-Civilian Use.

Scrap Rubber

The big news in the scrap rubber field this month was the announcement by the Rubber Reserve Co. that the agreements designating H. Muehlstein & Co., Nat E. Berzen, Inc., A. Schulman, Inc., and the Lowenthal Co. as scrap rubber agents of that government agency will be terminated as of December 31. It was made clear, however, that Rubber Reserve will continue to purchase acceptable grades of scrap rubber through December 31, with the understanding that all material so purchased must be shipped not later than that date. There are still considerable supplies of scrap rubber available and no tight corners are foreseen for some time to come. After January 1, supplies will again be handled in the usual trade manner. Prices shown below are ceilings on typical grades of scrap:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$20.00
Beadless truck tires	ton	26.00
Mixed truck tires	ton	20.00
Beadless passenger tires	ton	26.00
No. 1 passenger peelings	ton	52.25
No. 1 truck peelings	ton	52.25
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06½
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¼
Black truck tubes	lb.	.06½
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00

Tire Fabrics

The situation in the tire fabric field remains unchanged, with practically no demand for such fabrics. Consequently, prices are nominal and in many quarters are not even being quoted. The prices shown below are those which were in force on or about January 15, 1942.

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.43½ @	.44
Peeler, carded, 23/4/3	lb.	.44½ @	.45
Peeler, carded, 15/3/3	lb.	.41½ @	.42
Peeler, carded, 15/4/2	lb.	.41½ @	.42
Peeler, carded, 13/3/3	lb.	.40½ @	.41
CHAFERS			
Carded, American, 1 1/16"	lb.	.43½ @	.44
Carded, American, 1"	lb.	.39½ @	.48

Sheetings

48x40	36 in.	5.50	lb.	—	@ 7.818
40x40	36 in.	6.15	lb.	—	@ 6.991
40x36	36 in.	6.50	lb.	—	@ 6.615
48x48	40 in.	2.50	lb.	—	@16.200
48x48	40 in.	2.85	lb.	—	@14.210
56x60	40 in.	3.60	lb.	—	@11.944
48x44	40 in.	3.75	lb.	—	@11.066

Note: Prices shown above are ceiling prices set by order of the O.P.A. Quotations are based on an average price of 15-16-inch middling cotton of 20.37c at the ten designated southern markets.

Cotton

Midland uplands fluctuated within a range of 73 points on the Cotton Exchange since our last report (November 12), high for the period having been 20.53 on November 18 and low 19.80 on November 29. Trading for the most part was fairly active. The rush to even up positions in December obscured other market factors for a time although expectations of an early vote in the House on the anti-subsidy legislation was a restraining influence over selling in later positions. As a result of the unfavorable relationship existing between market prices for the staple and the government's 1943 loan rates, growers continued to place a substantial portion of their crop under the loan, according to the Cotton Exchange Service Bureau. The Commodity Credit Corporation's latest loan release, showing reported entries through December 4 of 2,134,462 bales, indicates that during the week ended with that date entries totaled approximately 193,000 bales, compared with 274,000 in the week first previous and 171,000 in the week second previous. Trade opinion as to the total amount of cotton that may go under the government loan this season continued to vary widely. One factor stated that unless there is unusually favorable war news, again reviving the idea of peace in the not very distant future, the market should slowly advance under price fixing in the near positions. Quotations for middling uplands on the Exchange follow:

	Nov. 12	Dec. 14		
	Close	High	Low	Close
December	19.64	19.51	19.51	19.56
March	19.39	19.57	19.44	19.55
July	18.96	19.14	19.03	19.13

Reclaimed Rubber

Reclaimers report continued operation of plants at near-capacity, with no slackening of the tremendous demand built up in recent months. A good portion of reclaim is still going into the manufacture of camelback, and there is some talk in official circles of increasing the 60% amount (the balance being GR-S) now going into the Grade C type. GR-S is still not too plentiful and if a tire crisis is to be averted next year the burden must be borne by recapping. This point is being emphasized in all official quarters. Experiments on reclaiming synthetic scrap also continue, and the problem is believed fully solved. Prices shown below are ceilings on typical grades of reclaim.

Shoe				
Unwashed	lb.	.07	@	.07¼
Tube				
Black Tube	lb.	.11¼	@	.11½
Red Tube	lb.	.12	@	.12¼
Tires				
Black (acid process)	lb.	.07½	@	.07¾
Black, selected tires	lb.	.06½	@	.06¾
Truck, Heavy Gravity	lb.	.08½	@	.08¾
Miscellaneous				
Mechanical blends	lb.	.04½	@	.05½
White	lb.	.13	@	.13¼

Ducks

Enameling (single filling)	lb.	—	@	.44¼
Belting and Hose	lb.	—	@	.39
Single filling, A grade	lb.	—	@	.19¾
Double filling, A grade	lb.	—	@	.20¾

CHEMICAL MARKETS

New York, Dec. 14, 1943
All Prices F.O.B. Works

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.28 @	.33
A-10	lb.	.36 @	42
A-19	lb.	.52 @	.65
A-32	lb.	.60 @	.70
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.43 @	.45
Beutene	lb.	.59 @	.64
B-J-F	lb.	.38 @	.43
Butasan	lb.	— @	1.13
Butyl Zimate	lb.	— @	1.13
Captax	lb.	.38 @	.40
Crylene	lb.	.40 @	.47
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.36
El-Sixty	lb.	.40 @	.47
Ethasan	lb.	— @	1.13
Ethyl Zimate	lb.	— @	1.13
Ethylidine aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.31 @	—
Guantal	lb.	.39 @	.48
Hepteen	lb.	.34 @	.39
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.13 @	—
Witco	lb.	.15 @	—
Ledate	lb.	— @	1.48
Methasan	lb.	— @	1.23
Methyl Tuads	lb.	— @	1.53
Methyl Zimate	lb.	— @	1.23
Monex	lb.	— @	1.53
Pentex	lb.	.74 @	.84
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	— @	1.63
R & R 50-D	lb.	.42 @	.43
R-2 Crystals	lb.	— @	1.55
Rotax	lb.	.48 @	.50
Safex	lb.	1.15 @	1.25
Santocure	lb.	.60 @	.67
Selenac	lb.	— @	1.98
SPDX	lb.	.70 @	.75
Super-Sulfur No. 2	lb.	.13 @	.15
Thiocarbanilid, drums	lb.	.28 @	.33
Thiofide	lb.	.43 @	.50
Thiotax	lb.	.38 @	.45
Thiurad	lb.	— @	1.53
Trimene	lb.	.54 @	.64
base	lb.	1.03 @	1.18
Triphenylguanidine	lb.	.45 @	—
Ulto	lb.	1.25 @	1.75
Ureka	lb.	.50 @	.57
Blend B	lb.	.50 @	.57
Blend C	lb.	.48 @	.55
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blues [b]			
Prussian	lb.	.36 @	—
Ultramarine	lb.	.17 @	.27
Browns [b]			
Mapico	lb.	.1135 @	—
Umber, Turkey	lb.	.04¼ @	—
Greens [b]			
Chrome	lb.	— @	.25
Guignet's Green	lb.	.70 @	—
Reds			
Antimony			
crimson, 15/17	lb.	— @	—
sulfur, free	lb.	— @	—
Indian	lb.	.08¼ @	—
Domestic (Maroon)	lb.	.11 @	—
Mapico	lb.	.096 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red	lb.	.09¼ @	—
Whites [b]			
Cryptone No. 19	lb.	.0560 @	.0585
Cryptone CB No. 21	lb.	.0560 @	.0585
Cryptone ZS-800	lb.	.0825 @	.0850
Lithopone:			
Albalith	lb.	.04½ @	.04½
Astrolith	lb.	.04¼ @	.04½
Azolith	lb.	.04¼ @	.04½
Ray-cal	lb.	.05½ @	.05¾
Rayox	lb.	.14½ @	.15¼
Titanox A	lb.	.14½ @	.14¾
Titanox B	lb.	.05¾ @	.06
Titanox C	lb.	.05½ @	.05¾
Zinc Oxide—American Process [b]			
American Azo:			
ZZZ (lead free)	lb.	.07¼ @	.07½
Anaconda, lead free	lb.	.07¼ @	.07½
Horsehead Lead Free Brand:			
Special—3	lb.	.07¼ @	.07½
XX Red—4	lb.	.07¼ @	.07½
XX Red—72	lb.	.07¼ @	.07½
XX Red—103	lb.	.07¼ @	.07½
Kadox, black label—15	lb.	.07¼ @	.07½
Red label—17	lb.	.07¼ @	.07½
St. Joe, black label	lb.	.07¼ @	.07½
green label	lb.	.07¼ @	.07½
red label	lb.	.07¼ @	.07½
U. S. P.—7, bbls.	lb.	.10½ @	.10¾

[a] Price Ceilings.
[b] Price Suggestions or Agreements.

Zinc Oxide—French Process: [b]			
Florence White Seal—7 bbl.	lb.	.09½ @	.09¾
Green seal—8	lb.	.09 @	.09¾
Red seal—9	lb.	.08½ @	.08¾
Yellows [b]			
Cadmolith	lb.	.55 @	.60
Chrome	lb.	— @	.50
Mapico	lb.	.071 @	—

BLACKS
(In bags, carload lots)

Aerfloted Arrow		.0355 @	—
Atlantic		.0355 @	—
Certified		.0355 @	—
Certified Spheron		.0355 @	—
Channel "S"		.12 @	—
Continental		.0355 @	—
Disperso		.0355 @	—
Dixiedensed		.0355 @	—
Dixiedensed 66		.0355 @	—
Excello		.0355 @	—
Furnex		.03½ @	.06
Furnex Beads		.03½ @	.06
Gastex		.03½ @	.06
Kosmobile		.0355 @	—
Kosmobile 66		.0355 @	—
Kosmos-Dixie 20	lb.	.03½ @	.06
Micronex (Amarillo)		.0355 @	—
Micronex Beads (Amarillo)		.0355 @	—
Pelletex		.03½ @	.06
P-33		.0475 @	—
Shell Carbon (Del. Midwest)		.0240 @	—
Sterling		.035 @	—
Supreme		.0355 @	—
Thermax		.0225 @	—
Thermax "S"		.0675 @	—
Wyex		.0355 @	—

COMPOUNDING MATERIALS

Aluminum Flake	ton	18.00 @	24.50
99½%-300	ton	— @	16.50
86-90%-300	ton	— @	13.50
Asbestine	ton	16.50 @	20.00
Atomite	ton	— @	27.50
Barium carbonate (98-100%)	ton	47.00 @	49.00
Barytes	ton	25.35 @	36.00
Bentonite	ton	11.00 @	16.00
Blanc fixe, dry	ton	60.00 @	67.50
Calcene	ton	37.50 @	43.00
Catalpo (fact)	lb.	.02 @	—
Chalk, precipitated			
Suprex white	ton	32.50 @	45.00
Clay, Aerfloted, Suprex	ton	10.00 @	22.50
Aerfloted Paragon	ton	10.00 @	22.50
Crown	ton	10.00 @	—
Dixie	ton	— @	10.00
Kaolloid	ton	— @	9.00
Langford	ton	— @	8.50
McNamee	ton	— @	10.00
Par	ton	— @	10.00
Witco	ton	10.00 @	—
Kalite No. 1	ton	— @	26.00
Kalite No. 3	ton	— @	36.00
Kalvan	ton	— @	100.00
Kalvan "S"	lb.	— @	.09½
Keystone white	ton	— @	14.00
Magnesium carbonate	lb.	.06¼ @	—
Mineralite	ton	— @	30.00
Pyrax A	ton	— @	7.50
Rottenstone (powd. Dom.)	ton	25.50 @	37.50
Rubberol	lb.	— @	.17½
Silene EF (calcium silicate)	lb.	.055 @	.06
Snowflake white	ton	— @	16.00
Talc, domestic	ton	17.00 @	25.00
Whiting, commercial	ton	16.00 @	26.00
Witco	ton	6.00 @	—
Witcal	ton	— @	100.00
Witcarb R-12	ton	— @	40.00
Wood Flour (100 mesh)	ton	30.00 @	32.00

MINERAL RUBBER

285°-300° Mineral Rubber	ton	25.00 @	—
Black Diamond	ton	25.00 @	—
Hard Hydrocarbon	ton	25.00 @	27.00
MilliMar	lb.	— @	.05½

MISCELLANEOUS

Aromatics—Rodo #0	lb.	4.00 @	4.50
Rodo #10	lb.	5.00 @	5.50
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dors	lb.	4.50 @	—
Aresklene No. 375	lb.	.35 @	.50
Darvan (dispersing agent)	lb.	.30 @	.34
Santomerse S	lb.	.11 @	.25
Sponge Paste	lb.	— @	.18
Sunproof	lb.	.22¾ @	.27¾
Tonox	lb.	.50 @	.59
Ty-Ply	gal.	6.75 @	8.00
Unicel (blowing agent)	lb.	.50 @	—

SOFTENERS

Acids			
Acetic, 28%, bbls. [a]	100 lb.	3.38 @	3.63
Nitric, 36 degrees	cwt.	5.00 @	—
Acids, Fatty			
Laurex	lb.	.14¾ @	.17¾
SL #10	lb.	.12 @	.14
Stearex Beads	lb.	.10 @	.11
Stearite	lb.	.10 @	—

Alkalies			
Caustic Soda, 76%	cwt.	2.70 @	5.70
Soda Ash, 58%	cwt.	1.15 @	2.95
Oils			
Degras, bbls.	lb.	.10 @	.12
Para-Flux	gal.	.17 @	.18
Para-Lube	lb.	.046 @	.048
Petrolatum, amber [b]	lb.	.03½ @	—
Pigmentaroil, tank cars	gal.	.20½ @	—
in drums	gal.	.26½ @	.27½
Pine, tanks	gal.	.55 @	—
Rosin Oil, cmpd.	gal.	.40 @	—
Rubberol	lb.	.13½ @	.14
Rubtack	lb.	.10 @	—
Seedine, c.l.	lb.	.07¼ @	—
Witco Palm Oil	lb.	— @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.06 @	—
coal tar	ton	19.00 @	22.00
hardwood	ton	16.00 @	22.50
pine, 200 lb. gr. wt.	bbl.	— @	4.50
Pigmentar, tank cars	gal.	.20½ @	—
in drums	gal.	.26½ @	.27½
Retort Pine Tar, drums	gal.	.26½ @	.27½
Solvents			
Acetone, pure [a]	lb.	.07 @	—
Benzene, 90%, tank car	gal.	.14 @	—
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.05
Carbon, bisulfide	lb.	.05 @	.08½
Carbon tetrachloride	gal.	.83 @	1.27
Dichlorethylene	lb.	— @	—
Dipentene, cml., drums	gal.	.48 @	.50
Ethylene dichloride	lb.	.07½ @	.08½
Plastogen	lb.	.07¾ @	.08
Reogen (drums)	lb.	.11½ @	.12
Rub-Sol	gal.	.09½ @	—
Trichlorethylene	lb.	.08 @	.09½
Turpentine, spirits	lb.	.78½ @	—
dest. dist., drums	gal.	.50 @	.55
Waxes			
Beeswax, white [b]	lb.	.58 @	—
Carnauba, yellow [b]	lb.	.83¼ @	—
Ceresin, white, dom.	lb.	.13½ @	.15
Montan, crude	lb.	— @	—
Paraffin [a]			
Yellow crude scale, 124/126	lb.	.04¼ @	—
Refined, 123/125	lb.	.05¼ @	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.95 @	2.05
Gel	lb.	.52 @	.54
Hipar	lb.	.61 @	.63
Powder	lb.	.43 @	.45
Resin	lb.	.43 @	.45
Resin D	lb.	.43 @	.45
White	lb.	1.23 @	1.33
Albasan	lb.	.69 @	.74
Antox	lb.	.54 @	.56
B-L-E	lb.	.43 @	.52
Flectol H	lb.	.43 @	.55
Flectol White	lb.	.89 @	1.00
Neozone A, B, C, D, E	lb.	.43 @	.63
Oxynone	lb.	.77 @	.90
Retardex	lb.	.45 @	.48
Santoflex B	lb.	.43 @	.55
Santoflex BX	lb.	.56 @	.64
Santovar O	lb.	1.15 @	1.40
S.C.R.	lb.	.33 @	.35
Stabilite	lb.	.52 @	.54
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.43 @	.52

EXTENDERS

Naftolen R-100	lb.	.10 @	.12
Vanzak	gal.	.05 @	.06

LUBRICANTS—MOLD & RUBBER SURFACE

Aresklene	lb.	.35 @	.50
Cocoa Soapstock	lb.	.06 @	.08
Colite	gal.	.90 @	1.15
Dipex	lb.	.06 @	.08
Glycerized Liquid Lubricant	gal.	— @	1.35
Lubrex	lb.	.25 @	.30
Mineralite	ton	— @	30.00
Sericite	ton	65.00 @	75.00
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.25 @	—
Amberex Type B	lb.	.18¼ @	—
Black	lb.	.08½ @	.13
White	lb.	.09 @	.15
Brown	lb.	.10 @	.14
Neophax A	lb.	.16½ @	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.08 @	.12
Sulfur Chloride, yellow (drs.)	lb.	.03 @	.08
Sulfur, rubber makers			
Refined (bags)	cwt.	2.55 @	—
Commercial (bags)	cwt.	2.20 @	—
Telloy	lb.	1.75 @	—
Vandex	lb.	1.75 @	—

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Industry.

The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York 19, N. Y.

Chemicals and Compounding Materials —

ACCELERATORS—
El-Sixty; Ureka; Ureka C; Guantal; Santocure; DPG; Pip Pip; A-10; A-32; A-46; A-100; R-2 Crystals • ANTIOXIDANTS—Flectol H, White; Santoflex B, BX; Santovar O.
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

CARBON BLACK
A Grade for Every Requirement
CONTINENTAL "AAA"—Low heat generating, extremely easy processing. "AA"—Low heat generating, easy processing. "A"—Medium cure, medium processing. "D"—Standard Channel Black.
Continental Carbon Company
295 Madison Ave., New York, N. Y.

CHEMICALS
Carbon Black—Clay—Colors
Accelerators—Sulphur
Stocks Carried At All Times
Ernest Jacoby & Co.
79 Milk St. Boston, Mass.
Cable Address: Jacobite Boston

AERO BRAND
RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
American Cyanamid & Chemical Corporation
30 Rockefeller Plaza, New York, N. Y.

CARBON BLACK—Aerfloted
WYEX — TX — HX
Compressed — Compact (Dustless)
J. M. Huber, Inc.
460 West 34th St. New York

CHEMICALS

For Rubber		For Industry Generally
Accelerators	*Acids*	*Latex*
Antioxidants	*Oil of Myrbane*	*Latol*
Specialties	*Aniline Oil*	*Dispersions*

NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 SIXTH AVE. NEW YORK

ALUMINUM FLAKE
A uniform, fine, low gravity, white reinforcing pigment. *Furnished to the rubber trade for 40 years.*
The Aluminum Flake Co.
Akron, Ohio

CARBON BLACK
"Atlantic" Carbon Blacks meet the exacting standards of modern rubber production.
Chas. Eneu Johnson & Co., Mfrs.
Distributed by
C. P. HALL CO.
Akron — Boston — Los Angeles — Chicago

CHEMICALS
For Natural & Synthetic Rubber
"PICCO" Brand—Plasticizers; Coumarone Resins; Reclaiming Oils, Coal Tar Naphthas.
Pennsylvania Industrial Chem. Corp.
Clairton Penna.

ALUMINUM HYDRATES
"Alorco" Hydrated Aluminas reinforcing pigments give many desirable properties to rubber. Send for sample.
ALUMINUM CO. OF AMERICA
1970 Gulf Bldg. Pittsburgh, Pa.

CARBON BLACK
DIXIE...KOSMOS
Used throughout the world
UNITED CARBON COMPANY
Charleston, W. Va.
New York • Akron • Chicago

CHEMICALS
A complete line of plasticizers, resins, substitutes, fillers, etc., for Synthetic, Natural and Reclaimed Rubber.
STANDARD CHEMICAL COMPANY
Akron Savings & Loan Bldg, Akron

ANTIMONY Pentasulphide, golden and crimson, very fine, pure.
Rare Metal Products Co.
Belleville, N. J.
Direct Factory Representation

CARBON BLACK
WITCO DISPERSO and DUSTLESS and a Complete Line of High Quality Rubber Chemicals
Wishnick-Tumpeer, Inc.
295 Madison Ave., New York, N.Y.

CHEMICALS AND MINERAL
Ingredients—Whiting, Clay, Talc, Barytes, Colors. Heavy Calcined Magnesia. Carbonate of Magnesia, Pumice Stone.
Standard Since 1890
Whittaker, Clark & Daniels, Inc.
260 West Broadway New York

CALCENE—SILENE EF
Two exclusive Columbia pigments proving exceptionally valuable to Rubber Compounders. Send for free data sheets.
PITTSBURGH PLATE GLASS CO.
COLUMBIA CHEMICAL DIV.
Grant Bldg., Pittsburgh (19), Pa.

CATALPO—The universal and standard rubber pigment now being used in treads, solids, tubes, carcass frictions, etc.
Moore & Munger
33 Rector Street New York City

COAL TAR CHEMICALS

Coumarone Resins	Tack Producers
Resinous Oils	Dispersing Oils
Reclaiming Oils	Softeners
	Solvents

The Neville Company
Neville Island, Pittsburgh, Penna.

CARBON BLACK-MICRONEX
The world's standard gas black; universally known as the "King of Rubber Pigments."
BINNEY & SMITH CO.
41 East 42nd St. New York City

Do you believe in Your Products?
Then you should believe in telling the rubber industry about them. The MARKET PLACE is the logical place to display your wares.

COLLOIDAL SULPHUR
COLLOIDAL ZINC OXIDE
COLLOIDAL COLORS
HEVEATEX CORPORATION
78 Goodyear Ave. Malrose, Mass.
Offices in New York, Akron, Chicago

The Market Place

The WHERE-TO-BUY Section of THE RUBBER AGE is where are listed the Products and Services of the Leading Suppliers to the Rubber Industry. If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York 19, N. Y.

Chemicals and Compounding Materials (continued)

COLORS
BRILLIANT ORGANIC DYES; PERMANENT, NON-BLEEDING, LOW COST
For All Cures
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

GASTEX
Special Process Reinforcing BLACK. Superior aging and oil resistant properties. Low permanent set.
Herron Bros. & Meyer, Akron, Ohio
General Sales Agents for
General Atlas Carbon Div.,
General Properties Co., Inc., Pampa, Texas

PARA-DORS—
overcome odors in rubber—effectively and at low cost.
GIVAUDAN-DELAWANNA, INC.
Industrial Aromatics Division
330 West 42nd St., New York, N. Y.

COMPOUNDING Materials
Vulcanizing Agents — Pigments
Accelerators — Clays
Antioxidants — Mineral Rubber
Plasticizers — Aromatics
Dispersions — Blacks
R. T. VANDERBILT CO.
230 Park Ave. New York City

IRON OXIDES
Asbestine—Barytes—Talc—
Soapstone
C. K. Williams & Co.
EASTON, PA.

PARA-FLUX
The Universal Softener—Adaptable, Uniform. Improves Quality—Economical.
The C. P. Hall Co.
2510 First Central Tower
Akron Ohio

CUMAR —Paracoumarone Resin.
A neutral gum for synthetic rubber compounding. *Laboratory test data, samples and prices on request.*
THE BARRETT DIVISION
Allied Chemical & Dye Corp.
40 Rector St., New York 6, N. Y.

LAMP BLACKS
Produced according to the rigid specifications of the makers of EAGLE and OLD STANDARD Germantown Brands.
THE L. MARTIN COMPANY, Inc.
Unit of Columbian Carbon Co.
BINNEY & SMITH CO.
Distributor of Rubber Blacks
41 East 42nd Street New York, N. Y.

PELLETEX (The pellet *Gastex*)
The special process reinforcing black in free-flowing form. Saves power; none wasted; protects adjacent colored stocks.
Herron Bros. & Meyer, Akron, Ohio
General Sales Agents for
General Atlas Carbon Div.,
General Properties Co., Inc., Pampa, Texas

DU PONT Rubber Chemicals
DU PONT RUBBER COLORS
DU PONT ACCELERATORS
DU PONT ANTI-OXIDANTS
E. I. du Pont de Nemours & Co., Inc.
RUBBER CHEMICALS DIVISION
WILMINGTON, DELAWARE

MAGNESIUM OXIDE
Calcined Magnesium Oxide prepared for use in the compounding of neoprene. Full details on request.
J. T. Baker Chemical Co.
Phillipsburg New Jersey

RUBBER PROCESSING OILS
For outstanding compatibility in processing natural or modern synthetic rubbers, use
SUN RUBBER PROCESSING OILS
Write
SUN OIL COMPANY
Philadelphia Pennsylvania

EXTENDER
NAFTOLEN R 100 — Extender for Crude Rubber, Reclaim, Synthetics.
Wilmington Chemical Corporation
10 E. 40th St., New York, N. Y.

MAPICO COLORS
Pure Oxides of Iron
Yellows—Reds—Browns—Black
MAGNETIC PIGMENT CO.
Manufacturers
BINNEY & SMITH CO.
Distributors
41 East 42nd Street, New York, N. Y.

RUBBER SUBSTITUTES
White, brown and black.
The Carter Bell Mfg. Co.
Springfield, New Jersey

"FACTICE"—Prevents blooming, makes colors fast and a smoother batch.
(Reg. U. S. Pat. Off.)
Stamford Rubber Supply Co.
Stamford, Conn.

MOLD LUBRICANT
"Orvus" enables articles to leave molds readily; molds clean easily. Effective in hardest water. Also acts as thorough cleanser for molded and extruded rubber goods.
PROCTER & GAMBLE
Cincinnati Ohio

SOFTENERS
Rosin Oil — Pine Tar
Burgundy Pitch
"Galex" — a non-oxidizing Resin
National Rosin Oil & Size Co.
RKO Bldg. New York, N. Y.

FURNEX—FURNEX BEADS
The High Resilience
Semi-Reinforcing Black
BINNEY & SMITH CO.
41 East 42nd St. New York City

OROPLAST
Plasticizer—Sulphur Reactive
High Loading Tolerated
Great Elongation Produced
Cool Processing Stocks
Advance Solvents & Chem. Corp.
245 Fifth Ave., New York 16, N. Y.

SOLVENTS
"Skellysolve"—A superior solvent in six different types for various uses—for making rubber cements—for many different rubber fabricating operations.
SKELLY OIL CO., SOLVENTS DIV.
Skelly Bldg., Kansas City, Mo.

The Market Place

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Chemicals and Compounding Materials (continued)

STEARIC ACID
STEAREX . . . CAKE or POWDER
STEAREX BEADS
Standardized Products for Rubber Compounding
MINERAL RUBBER (Parmr), TALC
SOAPSTONE
BINNEY & SMITH CO.
41 East 42nd St. New York City

WAXES
Johnson's lustrous wax finishes retard oxidation, reduce friction, surface wear, tackiness.
S. C. JOHNSON & SON, INC.
Racine Wisc.

ZINC OXIDE PIGMENTS
The XX Reds Kadox
ZINC SULPHIDE PIGMENTS
The Cryptones The Albaliths (Lithopones)
The New Jersey Zinc Sales Co.
New York *Chicago*
Cleveland, Boston, San Francisco

SULPHURS
Rubbermakers' TIRE BRAND and TUBE BRAND. Also CRYSTEX Insoluble Sulphur, Sulphur Chloride, Caustic Soda, Carbon Bi-Sulphide, Carbon Tetra-Chloride.
Stauffer Chemical Company
2710 Graybar Bldg., New York City

ZINC OXIDES
AZO ZZZ Zinc Oxides
lead free—pure—uniform—dependable
AZO ZZZ-11 AZO ZZZ-55
AZO ZZZ-22 AZO ZZZ-44 AZO ZZZ-66
American Zinc Sales Company
Columbus, Ohio *New York*
Chicago *St. Louis*

ZINC OXIDES
Black Label Red Label Green Label
Manufactured by Our New Electrothermic Process
St. Joseph Lead Co.
250 Park Ave., New York
Plant and Laboratory: Monaca (Josephtown), Pa.

TITANIUM PIGMENTS
TITANOX
Unsurpassed in
OPACITY, WHITENESS, BRIGHTNESS
Titanium Pigment Corp., Sole Sales Agent, 111 Broadway, New York, N.Y.
104 South Michigan Ave., Chicago
350 Townsend Street, San Francisco
2472 Enterprise Street, Los Angeles

The Progressive Concern Selling to Rubber Manufacturers Uses THE MARKET PLACE for Results

ZINC STEARATE
ZINC LAURATE
Colite Mold Lubricant for Extra High Gloss
THE BEACON COMPANY
87 Bickford St., Boston, Mass.

Machinery and Equipment

BANBURYS REPAIRED
Re-building and re-surfacing rotors and mixing chambers has been our specialty for years.
INTERSTATE WELDING SERVICE
914 Miami St. Akron, Ohio

CUTTING MACHINERY
Specialists in Rubber Cutting Equipment for Bands, Crude Stock, Jar Rings, Tubes, Rollers, Washers, Treads, Cement Stock, etc.
See Black Rock for All Cutting Problems
Black Rock Manufacturing Co.
179 Osborne St. Bridgeport, Conn.

FORMS - PORCELAIN
Exclusive Manufacturers of Vitreous Porcelain Closed End Forms
No matter what shape or design—we can make it. Send blue print or sketch for our prices.
The Colonial Insulator Co.
936 Grant St. Akron, Ohio

CALENDER SHELLS
Gammeter's
ALL STEEL Calender Shells.
All welded. Any size.
New and better.
The W. F. GAMMETER CO.
Cadiz Ohio

DIAL GAUGES—Thickness
For measuring the thickness of rubber and similar materials. Many models.
Frank E. Randall
248 Ash St.,
Waltham Mass.

GRINDING MILLS
SPAN grinding mill reduces soft and hard rubber to fine powder.
Made in U. S. A.
M. Pancorbo
155 John St. New York, N. Y.

CUTTING DIES
Cutting and perforating dies of all types for rubber manufacturers.
Send for our quotations
Brockton Cutting Die & Machine Co.
Avon, Mass.

DRYING MACHINERY
For Synthetic Rubber, Reclaimed Rubber, Latex Processed Materials, etc.
PROCTOR & SCHWARTZ, INC.
Seventh St. & Tabor Rd. Philadelphia, Pa.

MACHINERY—RUBBER
"Master" Tube Molds, Tire Vulcanizers, Molds and Cores, Tire Drums, Tubers, etc.
Special Machinery Built to Order
Akron Standard Mold Co.
Akron, Ohio

CUTTING DIES
Also Tools, Dies, Jigs, Fixtures. Machine Parts and Special Machinery. Now engaged in Prime and Subcontract Work, Defense and Civilian.
Independent Die & Supply Co.,
LaSalle & Ohio Sts. St. Louis 4, Mo.

EXTRUDERS
The pioneer line of tubers, strainers and wire insulating machines. For latest developments inquire of
JOHN ROYLE & SONS
Paterson New Jersey

MACHINERY
L. ALBERT & SON
Trenton, N. J. Stoughton, Mass.
Los Angeles, Calif. Akron, O.

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Machinery and Equipment {continued}

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A complete service from the design of machinery to finished products of all kinds. Equipment for Plantations — also Reclaim, Latex and Rubber Plants.
Layouts — Formulas — Processes
Continental Machinery Company
305 BROADWAY, NEW YORK, N. Y.

MANDRELS—All Types
Circular and Straight—Aluminum and Steel
Licensed Under Clyde E. Lowe Co. Patents
Sherardizing and Chrome Plating
Machinery—Air Bag & Mandrel Polishing
National Sherardizing & Machine Co.
Hartford, Conn. Akron, Ohio

SPECIAL MACHINERY
For Quality and Efficiency in Working Rubber. Consult us about your problems.
Utility Manufacturing Co.
Cudahy, Wisconsin

MACHINERY
A Comprehensive Line of Rubber and Plastic Equipment Including Tubers and Extruders, Tire Builders and Vulcanizers, Spreaders, Mixers, etc.
National Rubber Machinery Co.
Akron, Ohio

MOLDS
For tires, rubber specialties and mechanical goods; general machine work.
The Akron Equipment Co.
Akron, Ohio

STOCK SHELLS
A Type for Every Need—Large Diameter—Light Weight — Extra Strong — Seamless.
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MACHINERY
Cutting, Trimming, Skiving, Cementing, Eyeletting, Cutting Dies—Eyelets.
United Shoe Machinery Corp.
140 Federal St., Boston, Mass.

Processing Equipment
For Reclaiming Rubber
Attrition Mills; Conveyors; Crushers; Cutters; Elevators; "Frigidisc" Grinders; Hammer Mills; Mixers, Sifters, etc.
MERCER-ROBINSON CO., INC.
30 Church St., New York, N. Y.

TESTING MACHINES
RUBBER TENSILE TEST MACHINES
TEXTILE TESTING MACHINES
Write for Descriptive Literature
Henry L. Scott Co.
P. O. Box 963 Providence, R. I.

MAGNETIC EQUIPMENT of All Kinds
Separators, Clutches, Rolls, Drums, Brakes, Special Magnets
Stearns Magnetic Mfg. Co.
640 So. 28th St., Milwaukee, Wis.

RUBBER STRIP CUTTER
Strips slab rubber up to 1" thick, 20,000 feet in 8 hours. Any width. Tolerance 1/64 to 1/100 inch. No rejects. Write for full details.
Simplex Cloth Cutting Mach. Co.
270 W. 39th St., New York, N. Y.

USED MACHINERY
For Rubber & Allied Industries
Mills, Calenders, Hydraulic Presses, Tubers, Vulcanizers, Mixers, etc.
Eric Bonwitt
87 So. High St., Akron, Ohio

Rubber—Crude; Scrap; Latex; Dispersions

CRUDE RUBBER
BALATA—SYNTHETIC CHICLE
We handle Manufacturers' Crude Rubber and Balata Purchase Permits.
Charles F. Connor & Co., Inc.
110 State St. Boston, Mass.
Telephone: LAFayette 1202

DISPERSITE
Water Dispersed Rubber
(Reclaimed—Crude—Synthetics)
Man-made Alternate for Latex
Dispersions Process, Inc.
1230 Sixth Ave., New York, N. Y.
Branch Office in Detroit

LOTOL
(Compounded Latex)
Ready to use
NAUGATUCK CHEMICAL
Division of United States Rubber Co.
Rockefeller Center, New York, N. Y.
Branch Office in Detroit

CRUDE RUBBER
SCRAP RUBBER
Also HARD RUBBER DUST
H. Muehlstein & Co., Inc.,
122 E. 42nd St., New York City
BRANCHES: Akron, Chicago, Boston, Los Angeles, Memphis, London.

GUAYULE RUBBER
AMPAR BRAND
Washed and Dried
Continental-Mexican Rubber Co.
Incorporated
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Continental Rubber Co., of N. Y.

REVERTEX
Highly Concentrated (About 75%)
Rubber Latex
Sole Distributor for U. S. A. and Canada
Revertex Corp. of America
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CRUDE RUBBER
SCRAP RUBBER
HARD RUBBER DUST
BALATA — GUTTA PERCHA
Hermann Weber & Company
76 Beaver St. New York

LATEX
Normal, Concentrated, Processed
HEVEATEX CORPORATION
78 Goodyear Ave., Melrose, Mass
Offices in New York, Akron, Chicago

RUBBER
Crude Rubber
Liquid Latex
Ernest Jacoby & Co.
79 Milk St. Boston, Mass.
Cable Address: Jacobite Boston

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Rubber [Cont'd]

RUBBER and PLASTICS SCRAP

ROTEX RUBBER CO., INC.
437 Riverside Ave., Newark, N. J.

RUBBER—Scrap and Crude
Also HARD RUBBER DUST
A. SCHULMAN, INC.
790 E. Tallmadge Ave., Akron, Ohio
14th & Converse Sts., E. St. Louis, Ill.
738 Statler Bldg., Boston, Mass.
500 Fifth Ave., New York, N. Y.
Warehouses at Akron, E. St. Louis and Boston

VULTEX— THE ONLY VULCANIZED LATEX
Insures Highest Quality, Uniformity, Economy, Simplicity of Application.
FULLY PROTECTED BY PATENTS
Also Latex and Latex Compounds
General Latex & Chemical Corp.
Successors to the Vultex Chemical Company
666 Main St. Cambridge, Mass.

Reclaimed Rubber . . . .

NERVASTRAL RECLAIMING PROCESSES
HIGH GRADE — HIGH SPEED
HIGH ECONOMY
Rubber & Plastics Compounds Co., Inc.
30 Rockefeller Plaza, New York, N. Y.
Tel: COlumbus 5-0085

RECLAIMED RUBBER—
For All Purposes
NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 Sixth Ave., N. Y. City

RECLAIMED RUBBER—
Uniformity, reliability, cleanliness
PEQUANOC RUBBER CO.
Butler, N. J.

RECLAIMED RUBBER—
A standardized grade for every requirement.
U. S. Rubber Reclaiming Co., Inc.
500 Fifth Ave., New York, N. Y.
"60 Years Serving the Industry Solely as Reclaimers"

Rubber—Synthetic

HYCAR
For extreme resistance to heat, abrasion, oil, gasoline, aging, and deterioration.
HYCAR CHEMICAL COMPANY
335 South Main St.
Akron Ohio

NEOPRENE
In different types to meet stringent requirements.
The Neoprene Notebook carries up-to-date information on neoprene. Ask for it.
E. I. du Pont de Nemours & Co., Inc.
Rubber Chemicals Div.
Wilmington Del.

PERBUNAN
Oil Resistance—Heat Resistance
Long Life
Full information upon request.
STANCO DISTRIBUTORS, INC.
26 Broadway New York, N. Y.

THIOKOL
Synthetic rubber available in several types, including powder form. Excellent solvent resistance and aging properties.
THIOKOL CORPORATION
Trenton N. J.

Rubber Mnfrs.

MECHANICAL MOLDED RUBBER GOODS
Sponge Rubber: Sheeted—Die Cut—Molded
Your Inquiries Solicited
Barr Rubber Products Co.
Sandusky, Ohio

SANITARY GOODS—
Dress Shields, Baby Pants, Aprons, Elastic Belts, Bloomers, Stepins, Bibs, Guimps and Brassieres.
SPECIAL GOODS CUT TO ORDER
Rand Rubber Co., Inc.
Summer Ave. & Halsey St., Brooklyn, N. Y.

Miscellaneous

Use the
MARKET PLACE
Section
for Results

Fabrics—Liners, Hollands

CUSTOM FINISHERS of
RUBBER REPELLENT LINERS
Capitol Process Liner Treatment
—
Textile Proofers, Inc.
181-183 Culver Avenue
Jersey City, N. J.

PROCESSED LINERS
"CLIMCO"—Fabrics treated to prevent adhesion of rubber stocks.
"LINERETTE"—Treated paper for separating or interleaving light weight rubber stocks.
The Cleveland Liner & Mfg. Co.
5508 Maurice Ave., Cleveland, Ohio

SEPARATOR CLOTHS
"BRATEX" Rubber Holland and special Starch Filled Glazed Sheetings for Waterproof Separator Cloths; Also Coated and Impregnated Fabrics.
The Holliston Mills, Inc.
Norwood, Mass.

Consultants

CHEMISTS-ENGINEERS
Our staff of chemists, engineers and bacteriologists, with laboratories for analysis, research, physical testing and bacteriology are prepared to render you
Every Form of Chemical Service
FOSTER D. SNELL, INC.
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Product development, research, testing and patent investigations in the fields of rubber, synthetic rubber, and plastics.
WILBURN F. BERNSTEIN
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CONSULTING LATEX TECHNOLOGIST
R. J. Noble, Ph.D.
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CONSULTING
Rubber Technologist
Natural and Synthetic Rubber
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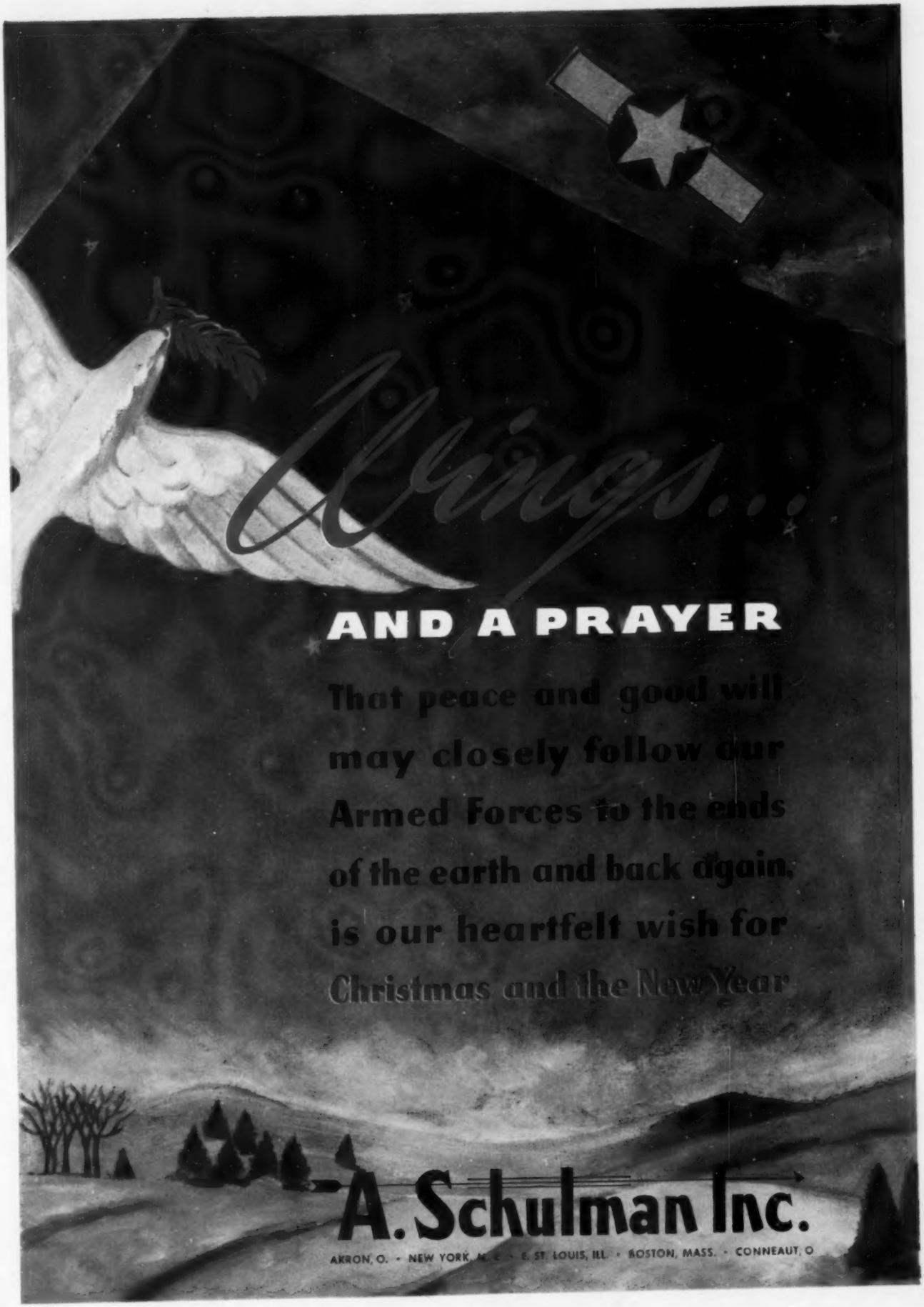
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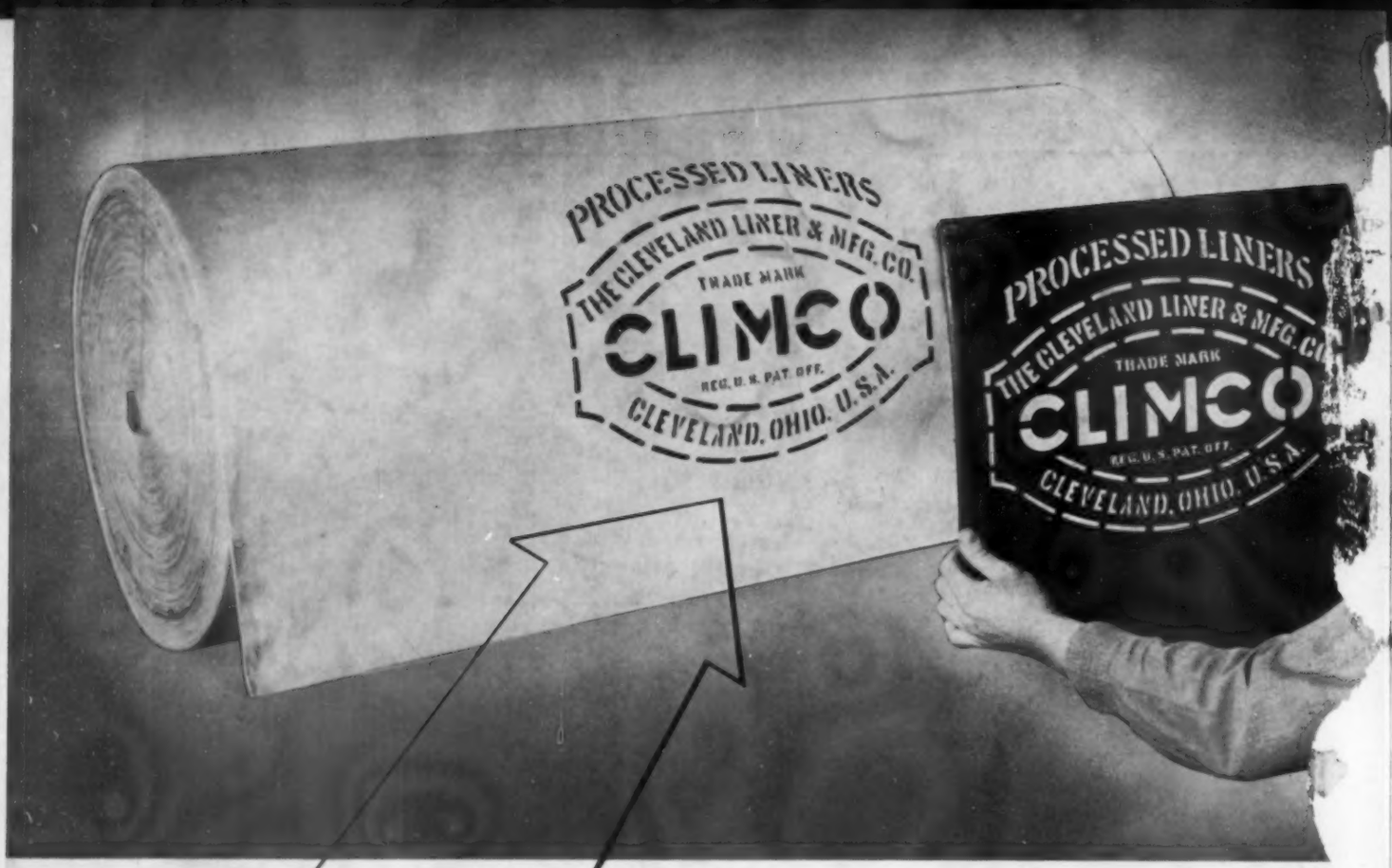

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